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ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

The World Crisis and Railways

IF only as a warning, the description of the activities of the Federal Co-ordinator of Transportation in the U.S.A., given by Mr. Ashton Davies in a special report to the International Railway Congress Association entitled "The World Crisis and Railways," is valuable. Elsewhere we briefly summarise the report, which is the result of one of those inquiries into questions of immediate interest decided upon by the Permanent Commission of the Congress Association on July 29, 1933. Mr. Ashton Davies was charged with undertaking this particular inquiry, and his report is published in full in the current issue of the *Bulletin* of the Association. As the inquiry covers only railways not affiliated to the International Railway Union, it excludes those of Great Britain and the Continent of Europe. It deals in greatest detail with those of the U.S.A., and indicates how effectively the administrations have adapted themselves to the catastrophic curtailment of spending power—which is the root of the crisis—before Co-ordinator Eastman was appointed to show them the way. The U.S.A. is a 98 per cent. self-contained country, *i.e.*, it can produce in its own territory a sufficiency of all but 2 per cent. of every commodity required by its population. There is no physical reason therefore why the American people should not enjoy the abundance available independently of other countries, yet such are the mysterious workings of the human mind that, despite the great poverty of a large proportion of the citizens of the U.S.A., efforts have been made to curtail transport facilities and production generally rather than to increase them and arrange for their general distribution.

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The Pope Indian Railways Second Report

On page 1138 of this issue we publish a précis of the Second Report of the Pope Economy Committee upon Indian Railways. This valuable document points the way to many further avenues of greater efficiency and economy as well as showing that the recommendations of the committee's first report are already bearing fruit. In forwarding this report to the Chief Commissioner of Railways, Mr. Pope observes that the principle of job analysis involves a systematic overhaul of every post and activity of a railway, a work which must necessarily take a long time. The new arm of organisation must, therefore, continue to function for some considerable period. While many of the schemes suggested will effect savings and improvements without reduction of staff, by far the larger proportion of economies proposed will entail the employment of fewer staff, and the rate at which the benefits of job analysis will be felt depends on the rate at which the complement of staff can be adjusted to the altered methods. Increased use of up-to-date locomotive power is a rational recommendation, and it is interesting to learn that the increase of engine mileage has already been worked up until one British standard locomotive ran 13,256 miles under normal Indian passenger conditions in December last. The suggestions regarding improved methods of salesmanship are particularly pertinent.

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The Week's Traffics

The returns of the four group companies for the past week compare with a week in 1933 when passenger train traffics were rather heavily down in comparison with 1932 and merchandise earnings had begun to show a welcome increase. In all cases except the Southern the passenger train increases of the past week do not exceed the decreases shown in the corresponding week of 1933, whereas the merchandise increases are all on top of gains in the 1933 week. For the 25 weeks of the year to date the aggregate traffics of the four companies amount to £68,117,000, an increase of £3,430,000 or 5·30 per cent. on the corresponding period of 1933 when there was an aggregate decrease of £2,761,000 on 1932.

	25th Week				Inc. or dec.	
	Pass. &c.	Goods, &c.	Coal, &c.	Total.	Year to date	
	£	£	£	£	£	%
L.M.S.R. ..	+ 5,000	+ 31,000	− 7,000	+ 29,000	+ 1,381,000	+ 5·28
L.N.E.R. ..	+ 11,000	+ 20,000	—	+ 31,000	+ 1,435,000	+ 7·60
G.W.R. ..	+ 3,000	+ 14,000	− 8,000	+ 9,000	+ 401,000	+ 3·66
S.R. ..	+ 18,000	+ 3,000	+ 1,000	+ 22,000	+ 213,000	+ 2·44

The Belfast & County Down has an increase for the week of £279, and the Great Northern one of £1,800.

* * * *

Lt. Col. F. A. Cortez Leigh, T.D.

It is given to few men to carry through so many important electrification schemes as have fallen to the lot of Lt.-Col. F. A. Cortez Leigh, who, as we have already announced, is about to retire from the position of Electrical Engineer of the London Midland & Scottish Railway. Soon after his appointment as Chief Electrical Engineer of the London & North Western Railway in 1909, he carried out the electrification of the Euston-Watford and Broad Street-Richmond suburban services, which included the design and erection of Stonebridge Park power station, all the electric track, substations, rolling stock equipment and repair shops. On the L.M.S., in addition to electric traction, he has been in

charge of all the electrical equipment in works, docks, ships and stations. The amalgamation of the various electrical departments of the eight principal railways now forming the L.M.S. into a single one controlled from Euston was by no means a light task, and it furnished another opportunity for demonstrating his well-known administrative abilities. Furthermore, and this may in some ways be regarded as his *magnum opus*, he was jointly responsible with Mr. Gresley for the conversion of the Manchester, South Junction and Altrincham Railway, the first high-tension overhead direct-current passenger line in this country. Perhaps even more striking proof of that freshness of mind, which Lt. Col. Cortez Leigh still retains, is to be found in the pioneer work he has recently carried out in the application of glass bulb mercury rectifiers to heavy traction work. It will be gratifying to his many friends in the railway and electrical world to know that his services are being retained in an advisory capacity at Euston.

* * * *

Overseas Railway Traffics

While the traffics of Argentine railways and of the Bombay, Baroda & Central India have shown decided improvement during the past two weeks those of the Canadian Pacific have had a substantial set back amounting to £118,800 in the same period, though for the year to date there is still the handsome increase of £1,280,600 in gross earnings. In the 23rd week of 1933, however, the Canadian Pacific had a gain of £28,200 over the corresponding week in 1932. Within the past two weeks the Buenos Ayres & Pacific has added £37,000 to its former increase, the Central Argentine has reduced its decrease by £77,000, the Buenos Ayres Great Southern decrease has been lessened by £64,000, and that of the Buenos Ayres Western by £11,000. For the year to date the Entre Rios has an aggregate increase of £24,100, and the Antofagasta in the 25 weeks of the half-year records a gain of £74,080.

Railway.	No. of Week.	Weekly Traffics.	Increase or Decrease.	Aggregate Traffic.	Increase or Decrease.
		£	£	£	£
Buenos Ayres & Pacific	51st	122,000	+ 22,000	5,711,000	+ 71,000
Buenos Ayres Great Southern ..	51st	220,000	+ 40,000	10,278,000	— 111,000
Buenos Ayres Western	51st	70,000	+ 5,000	3,477,000	— 1,000
Central Argentine	51st	210,000	+ 32,000	8,751,000	— 424,000
Canadian Pacific	24th	428,600	— 77,600	10,741,200	+1,280,600
Bombay, Baroda & Central India	11th	169,875	+ 15,300	1,892,250	+ 75,075

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An Arrested Tide

Most suitable of adjectives with which to review the summer train services, to be introduced by British railways on July 9, is probably "featureless." Not absolutely featureless, of course, for there are the new railcar services on the Great Western and London & North Eastern Railways, and, as detailed in our review of the new time-tables on page 1153, there are modest accelerations to be discerned here and there, as in the South Wales services of the Great Western Railway, and between Bournemouth and Weymouth on the Southern, and of an odd train here and there with ten minutes or so pared from its schedule. But it takes a good many more swallows than this to make a real summer. Two years ago the railway speed traditions of many previous years in this country were broken, and through the barriers there surged what we hoped to be a really high tide of acceleration, so popular with the public, and, as results seem definitely to have indicated, so profitable in attracting traffic. Now, however, apart from the minor wavelets that we have indicated, the tide appears to have been arrested. In other countries, Germany, France, Belgium and America in particular, it is still flowing vigorously, and in the movement towards higher railway speeds we are very gradually getting left behind. That there are many fine and fast schedules in this country need not be disputed, but it could hardly be claimed that the work of train service improvement in Great Britain is yet complete. If summer trainloads and congestion make further expedition difficult, let us hope that the October time-tables will tell a different story.

* * * *

The Popularity of Speed

A correspondent of our monthly contemporary, *The Railway Magazine*, recently communicated notes of some observations which he had made at Wilmslow on the working of the up Mancunian express of the L.M.S.R. During the period of the Easter school holidays in 1933, he observed that on leaving Wilmslow for the non-stop run to Euston the train was made up once to 13 coaches, four times to 12, six times to 11, six times to 10, and once to 9 vehicles—an average of roughly eleven coaches daily. In the corresponding period of 1934 the maximum load observed was 23 coaches on two different days (when the train was duplicated), 16 coaches once, 15 coaches three times, 14 coaches twice, 13 coaches twice, 12 coaches seven times, and 11 coaches—the minimum—six times, which gives an average of 13½ vehicles daily. The increase may be in part explained by ticket concessions, or by the introduction of third-class stock with armrests, which slightly reduce the accommodation per coach when the armrests are in use; but we cannot help thinking that speed is part of the attraction which has increased the passenger patronage. Two years ago this express was accelerated to make one of the fastest runs of the L.M.S. system, and it is now booked to cover the 176·9 miles from Wilmslow to Euston in 172 min., at an average of 61·7 m.p.h.

* * * *

Air Conditioning

Until recently the train had, for the regulation of the inside temperature, only its steam heating pipes and its adjustments for ventilation, and these, depending on the taste of the passenger having the last word, led to a more or less unsatisfactory state varying between the inclemencies of a Siberian winter and the fug of the average bar-parlour. The Americans with their characteristic thoroughness are putting an end to all this in at least 100 of their best expresses. Having determined, if not what is comfortable for all people, at least what is good for them, they have equipped many hundreds of their cars with plant for establishing and maintaining the approved degrees of atmospheric purity, humidity and temperature. Fresh air, admitted only through the openings especially provided, is mixed with recirculated air in the proportion of 1 to 3, and the whole is filtered, cooled, and otherwise adapted for the consumption of passengers, who can now reach their destinations on the hottest days as cool as cucumbers, and in as good a condition as the similarly but more rigorously treated products coming to Britain from Australasia and South Africa. Elsewhere in this issue we describe the new development which might well help to increase the popularity of railway travel, provided the loss of an ancient liberty will be tolerated by the more meddlesome kind of person who is never content to take any of the things that suit his fellows.

* * * *

Great Southern of Spain Railway

Results of working the Great Southern of Spain Railway during the year 1933 continued to be affected by the increased expenditure still arbitrarily imposed, though the Government relief promised by the Act of 1924 has been

for some time withdrawn. The report shows that the net loss for the year 1933 was £15,769, as against £28,199 for 1932, this difference being due to a small increase in the iron ore traffic following an improvement in the iron and steel trade, and to a further reduction in working expenses. In passenger traffic there was some expansion due mainly to the introduction of cheap third class bookings in connection with a similar concession on neighbouring railways between Madrid, Barcelona and Lorca twice a week, to meet a new motor omnibus competition. Some figures for the two years are compared below:—

	1933	1932
	£	£
Passenger receipts	14,279	13,625
Merchandise receipts	59,382	65,095
Mineral receipts	32,644	24,213
Gross receipts	109,351	106,371
Working expenses	114,166	126,438
Loss on working	4,815	20,067

The tonnage of local merchandise traffic was 20 per cent. less than in 1932, chiefly due to a decrease in stone traffic caused by completion of the roads under repair in the province of Granada.

* * * *

Popularising Swiss Travel

A news paragraph on another page of this issue summarises the reduced fare facilities offered during the Swiss Travel Week at the beginning of this month, and we have already referred on several occasions to Switzerland's enterprise in attracting tourist traffic. It remains to record that a unique sort of encouragement was offered to Swiss railway travellers for a couple of weeks in the month of April last. Any passenger with a full-fare ticket was permitted to take with him, without extra charge, two children of under twelve years of age, or one child under sixteen. The privilege extended equally to tickets issued by agencies outside the country. The advantage of experiments of limited duration, such as these is that even if loss is incurred it is restricted to a short period of time, and even then there has been the publicity value of the increased travel so encouraged. On the other hand, it is possible to test the economics of a concession without the railway having committed itself indefinitely; and the result of the experiment, after study, may influence future railway policy. The unceasing efforts of the Swiss Federal Railways to attract custom are certainly worthy of appreciative comment, and it is to be hoped that they will be adequately rewarded.

* * * *

Testing by X-rays

We have previously drawn attention to the use of X-rays for examining welded joints and detecting flaws in forgings. More recent investigations have shown that by the use of the diffraction of X-rays, it is possible to examine the crystalline structure of a substance and thus to deduce its properties. Some idea of the commercial possibilities of this new method can be obtained from the pamphlet entitled "The Industrial Application of X-Ray Crystal Analysis," which has just been issued by the Department of Scientific and Industrial Research. Briefly the method consists of allowing a fine pencil of X-rays to fall on the specimen to be examined, the diffracted rays being recorded on a suitably placed photographic plate or film. The nature of the pattern depends not only on the chemical structure of the material, but on the size of the crystal grains, their direction and so on. Moreover, it is possible to investigate crystals the grain size of which is less than 10^{-5} cm., this being too small for microscopic investigation. Photographs are reproduced in the pamphlet showing—among other things—the effect of cold-rolling and drawing, the effect of heat treatment and the effect of crystal size on the properties of electrically deposited chromium plating. It may be noted that the National Physical Laboratory is prepared to undertake X-ray research into industrial problems.

* * * *

Underground Engineering Problems

The reconstruction of tube stations in the Central London area almost invariably presents difficult engineering problems by reason of the necessity of diverting a multiplicity of sewers, gas, water, and electric light mains, and possibly buried rivers and streams, in an extremely restricted space. The opening on Monday last of the new Chancery Lane station marked the completion of a reconstruction task of more than usual complexity which has occupied over two years and cost approximately £230,000. In the course of excavations for the new station the contractors came across the foundations of the old Middle Row, which stood at one time in the middle of Holborn. The course of the River Bourne, which once flowed across Holborn into the Fleet River, was also struck during boring operations at a depth of 10 ft., exactly at the spot destined for the new escalators. In this case it was found necessary for men, working under compressed air, to enclose the stream in a steel shell. A further obstacle was the Post Office tube which runs under Holborn. The new works required its diversion, and it has now been curved sharply so as to run round Chancery Lane station of the Central London Line. The new station, which is entirely below the surface, is briefly described and illustrated on page 1155 of this issue.

* * * *

A Drawbar Horse-Power of 2,100

A remarkable trial run has been made with the new L.N.E.R. 2-8-2 express locomotive No. 2001, *Cock o' the North*. As has been stressed in the description of this engine, the prime requisite, on the service for which it has been designed, is a capacity to accelerate rapidly from rest and from service slacks, and to perform high-speed work uphill. Beyond a brief maximum speed of 76 m.p.h., attained with the engine coasting, therefore, no attempt was made to exploit No. 2001's ability downhill, but attention was concentrated on uphill possibilities. These were brilliantly demonstrated with a 649-ton load on the long ascent from Essendine to Stoke summit, between Peterborough and Grantham, the full details of which are set out on page 1147. After climbing 4½ miles at 1 in 200 with no greater fall in speed than from 63 to 56 m.p.h., No. 2001 attained 60½ m.p.h. on 1½ miles of nearly level, and went up the final 3 miles at 1 in 178 at a minimum of 56½ m.p.h., and a maximum cut-off of only 30 per cent. Thus the 11·5 miles of the climb occupied no more than 11 min. 38 sec. all told, and a maximum drawbar pull of 6·1 tons at 57½ m.p.h., with a maximum drawbar h.p. of almost 2,000, were registered in the dynamometer car. Indeed, for 7 miles continuously the drawbar pull never fell below 5 tons, nor the d.b.h.p. below 1,800. Similarly on the return journey, the lengthy climb to Stevenage was surmounted at a minimum speed of 56 m.p.h., and on this climb 2,100 d.b.h.p. was recorded. Apart from extraordinary hill-climbing ability at short cut-offs, Mr. Gresley's new locomotive showed a capacity for free running when coasting that must approach that of an ordinary bogie passenger coach. This promises very economical performance, and we feel justified in looking forward to some handsome curtailment of existing schedules up the East Coast of Scotland when the whole of the new class is at work.

Punctuality

IN the June issue of the *L M S Magazine* there appears an article by the Chief Operating Manager, Mr. C. R. Byrom, entitled "Acceleration of Passenger Trains." After setting out what has been done by the London Midland & Scottish Railway in this direction during the past two years, both in the reduction of times on long distances, and in the improvement of the services to intermediate points by the insertion of additional stops in express schedules without any lengthening of the overall journey time, Mr. Byrom proceeds to review various of the difficulties in face of which acceleration is carried out. Among these are the considerable increase in tare weight per passenger conveyed which is imposed on the locomotives by the amenities of modern travel, the fact that the service by all expresses, even the fastest, is open to all classes of passengers without restriction, even including those travelling at considerably reduced fares, the matter of line occupation, with the contingent task of finding fresh paths for accelerated trains, and so on. As regards the publicity value of speed, however, attention is drawn to the fact that—other things being equal—the travelling public will flock to the faster trains, and that acceleration may be productive of new business. The concluding paragraph of the article then opens with a contention which we have often ventured to emphasise in these columns. It is that "the value of acceleration depends almost wholly on the extent to which the promise of the time-table is kept."

"I know, of course, that very great efforts are already being made to achieve punctuality," Mr. Byrom writes, "and that a great amount of time unavoidably lost by engineering delays or in running is already being recovered—a state of things for which all concerned in the working of the passenger services are jointly responsible. But the results are still not so good as I should like them to be, and the travelling public is apt to judge by results alone, and to make little if any allowance for causes. Fractional overtime at stations, or the trifling delay due to the momentary sighting of a distant signal at danger—scarcely noticeable on the easier schedules of three or four years ago—is vital to trains worked at to-day's accelerated timings, and it is the cumulative result of little delays like these that spoils the record of our express arrivals. We are proud—and rightly proud—of our passenger service and of its high standard of speed and comfort; let us make sure that we can be just as proud of its record for punctuality!" The words "all concerned in the working of the passenger service are jointly responsible" may be regarded as both an implicit and an explicit encouragement to the making up of lost time on the L.M.S.R. from its chief operating officer, and we trust that they will evoke a widespread and wholehearted response.

So far as we are aware, the only specific instruction to enginemen on the matter of making up lost time that has hitherto been given in this country was issued by the Great Western Railway to its locomotivemen in 1927, in the following terms: "When trains have been delayed and are behind time, every effort should be made to arrive at destination punctually by running at less than schedule time where possible, but all speed restrictions, both permanent and temporary, must be strictly observed." It is patent to every regular traveller that since that date there has been a considerable improvement in main line timekeeping on the G.W.R., which has now reached a generally high level on its fast services, and it is probable that in this instruction and the improvement we have a case of cause and effect. Many British enginemen need no encouragement in the making up of lost time, and may be relied on to do their level best at all times to ensure a punctual arrival; others may, on any specific run, be at the mercy of abnormal circumstances, such as exceptional loads, engines of inadequate power or needing overhaul, or of inefficient control working, or an undue number of closely adjacent permanent way slacks, which separately or together make exact timekeeping impossible. But with all such allowances, there is a residuum of drivers who will never make any attempt to recover time which has been lost in circumstances not under their own control, and who can always be relied on to arrive behind time if they have experienced any delays on their runs. Such "go-as-you-please" methods ought to be impossible.

What of the timekeeping in other countries? An article in the May issue of our monthly contemporary *The Railway Magazine*, on "Modern Locomotive Work in France," quoted from a couple of correspondents who paid a tribute to remarkable timekeeping records on certain lines over which they travel frequently. One, a resident in Geneva, says of the Alsace-Lorraine Railways, "I have been travelling on this line to and from Antwerp about once a month for the past three years, and I do not recall a single signal check." Another writes of the Paris-Orleans Railway, "I have timed 25 runs between Paris and Bordeaux, and *vice versa*, including all types of train other than the Sud Express, and, in a few cases, night trains. The total time gained by the engines, in recovering from permanent way checks and overtime at stations, is 777 min., which works out at an average of 31 min. per run. All arrivals at both ends of the journey have been uniformly punctual, except for checks between the Benange and St. Jean stations at Bordeaux in one or two instances." To passenger train punctuality in Germany, notwithstanding the revolutionary acceleration of train services which is now taking place in that country year after year, we have made numerous references in recent issues; and such American happenings as the unblemished punctuality record of the Broadway Limited express of the Pennsylvania Railroad on 362 days out of 365 in a single year, are fresh in mind. During the past winter the fact of half-an-hour's late arrival in New York of the high-speed Twentieth Century Limited express of the New York Central Lines, after a blizzard of unprecedented intensity, was looked on almost as a nine days' wonder.

In years gone by the fact that Great Britain had an unchallenged supremacy in the speed of her express services might have been regarded by some as a palliative for a punctuality record less perfect than that of other countries. But this supremacy no longer obtains; and increasing speed abroad seems to result in even better rather than worse punctuality records. How can the matter be rectified? First, by definite instructions to enginemen that, within the limits of locomotive capacity and speed restriction observance, lost time should be regained. Perhaps the simplest way to achieve this object is by laying down in the working time-tables minimum sectional times over each main route, proportioned to the power class of the locomotive and the load, which must be worked to, irrespective of the train concerned, when it is running behind time. Speed indicators on locomotives, even if not self-recording, would enable drivers to observe restrictions accurately. Then a rigid supervision should be exercised over control offices, to ensure that inattention to margins between freight and passenger trains does not cause avoidable delay to the latter, or put unnecessary obstacles in the paths of drivers who are doing their utmost to regain lost time. By scientific planning of the permanent way repair and renewal programme, which certain areas of our railways have shown to be a practical policy, the serious delay occasioned by a series of closely adjacent permanent way slacks can be avoided. Smart station working should be encouraged, and there is plenty of proof available that the best

encouragement is given by cutting down stopping times rather than by increasing them. Lastly, as we have previously suggested, the first railway to try a " Punctuality Week " will probably be surprised at the permanency of the results achieved, as well as by the popular support and publicity value of such an experiment.

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Speed Possibilities with Steam

SOME significant examples of present-day British express locomotive capacity are set out in detail on page 1149 of this issue. They bear witness to the fact that, even in this era of the high-speed railcar, the modern steam locomotive, given the opportunity, can still prove, in long-distance running, a serious competitor of the later modes of transport. Each feat was the more worthy of remark in that it was achieved in ordinary service conditions, and without the stimulus of special demonstration conditions or probable publicity. Certainly the Great Western journey was made on what might be termed a " publicity " train, the schedule of which owes its speed, in some measure at least, to the determination of its owners to claim the fastest steam-operated train in the world; but the fact remains that, with a load 33 per cent. above that on which the booking was originally based, the driver found no difficulty in gaining time, and but for deliberate easing of his engine in the later stages of the run, would have covered the 77·3 miles from Swindon to Paddington in half-a-minute over the even hour. As it was, he maintained an average speed of 82·8 m.p.h. for 60·7 miles with a train of 249 tare tons, providing 332 passenger seats, luggage accommodation, and restaurant service.

On the London & North Eastern Railway the times noted were on an ordinary Scottish express, made up to the considerably heavier load of 13 coaches, equal to 417 tons tare weight. This was run for 16·6 miles of but little easier than level track, in bad weather conditions, at an average speed of precisely 80 m.p.h., and again it seemed that such a speed might have continued indefinitely but for running too much ahead of time. In this case, even with passengers seated only three a side in the third class compartments, the train provided accommodation for over 400 passengers, with the full amenities of restaurant car accommodation and capacious luggage space. We stress these capacity figures, for they show, in the former instance, that the speed of, say, the Flying Hamburger railcar can be nearly equalled by a steam locomotive drawing a train which provides three times the accommodation of the latter, and not specially prepared by streamlining for exceptional speeds. Similarly the L.N.E.R. Pacific proved itself capable of a sustained speed of 80 m.p.h. on the level, with a train of four times the Flying Hamburger's capacity.

From the railway point of view a light railcar, especially if it is diesel driven, has the advantage of running at a considerably lower operating cost than an ordinary steam train. But it must be remembered that it is limited to a specific kind of service. For high speed inter-city services with limited loads, supplementary to the ordinary train service, railcars are proving commercially attractive on the Continent, and it is these and local services that comprise their best field. But we are glad to see those Continental railways that are using the high speed railcar at the same time taking fuller advantage of their steam locomotives to speed up the orthodox trains. The development of the steam locomotive during the past two decades proves that steam is still a formidable rival of the newer form of propulsion as regards speed, and is superior where high speed has to be maintained with heavy loads. Attention to front-end design, providing for freer exhaust of the used steam, in conjunction with short cut-off working, high boiler pressures, and improved methods of lubrication, have all considerably raised the capacity of existing locomotive types for sustained high speed work. The columns of " British Locomotive Practice and Performance," a monthly feature of our contemporary, *The Railway Magazine*, show that, whereas twenty years ago a speed of 80 m.p.h. or slightly over might figure once or twice in an article, on the average, speeds of 90 m.p.h. in ordinary service are now not infrequently recorded. All British railways can now furnish their examples of very fast travelling. We recently timed the up Bournemouth Belle of the Southern Railway, with eight well-filled Pullman cars of 330 tons weight, to cover the 23·5 miles from Basingstoke to Woking, pass to pass, at an average speed of 78·3 m.p.h., with an engine of the 4-6-0 Lord Nelson type. Over the undulating 67·2 miles of the L.M.S.R. from Welton to Wembley, including the lengthy rise to Tring Summit, we have noted times of 53 min. 9 sec. and 53 min. 54 sec. with ordinary expresses of 296 and 354 tons weight respectively, hauled by 4-6-0 Royal Scot engines; and the feats of similar locomotives with the Coventry specials of last autumn will be remembered, when the engine *Vesta* maintained an average speed, on two consecutive days, of 79·1 m.p.h. over 235 miles of the same course. Thus there is still a margin between existing time-tables and the ultimate of speed with steam traction even with existing engines.

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Ceylon Government Railway

THE administration report for the year ended September 30, 1933, which is the second to be issued by Mr. E. W. Head, the General Manager, shows that traffics continued to be affected by road motor competition and trade depression. Earnings were 10·50 per cent. lower than in 1931-32, but there was a saving of 8·69 per cent. in expenditure. Route-mileage remained the same as in the previous year (951 miles), but track mileage was increased from 1,025 to 1,030 by the extension of the duplication of the Coast line for the 1¾ miles between Egoda Uyana and Panadure, and the duplication of the Kelani Valley line from Maradana to Loco Junction. In connection with these works, new signalling and interlocking schemes, fully track circuited, were brought into full service during the year. Good progress has been made with the new locomotive, carriage and wagon workshops at Ratmalana, and during the year a transfer was effected of most of the work of the Mechanical Department from Maradana to Ratmalana. Some operating figures are compared in the following table:—

	1932–33	1931–32
Passengers	10,854,306	12,353,554
Merchandise, tons	851,626	971,641
Train-miles	4,137,497	4,414,992
Operating ratio, per cent.	95·37	93·47
	Rs.	Rs.
Passenger receipts	7,539,419	8,378,370
Merchandise receipts	9,950,226	11,414,841
Gross revenue	19,711,602	22,024,355
Expenditure	18,799,390	20,587,646
To renewals fund	519,850	1,101,218
Net revenue	392,362	335,491

Ruinous competition on parallel roads is still holding sway, but stricter police control over the overloading of goods vehicles is expected to have good results, and the sustained efforts made by the railway administration to recover traffic have met with success. Economies have been practised in many directions, the largest decrease being in the working cost of the Transportation Department, due to the curtailment of the train service. There was a gratifying reduction of 2·38 lb. in the cost of fuel per engine mile, despite train service curtailments.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Recovering Lost Time

28, Ashburn Place, S.W.7.
June 23

To the Editor of The Railway Gazette

Sir,—Mr. Clinker says that the cause of no railway accident during the last 90 years has been definitely assigned to the late running of any particular train. As hardly a word was heard either from the railway companies or in the Board of Trade report of the unpunctuality which was the predisposing cause of the Gretna accident, I can well believe that this is the case.

Mr. Peters asks me about calculating safe limits of speed. What I said was that all speed limitations necessary for ensuring safety could be accurately calculated. By this I meant that it is easy by calculation to lay down limitations, which, if respected, will prevent accidents from occurring through excessive speed. These are the conditions under which Mr. Peters and his colleagues are running their trains every day. He seems to have attached some other meaning to my words.

Your obedient Servant,
MONKSWELL

Central Interchange Stations

65, Oxford Gardens,
London, W.10.
June 25

To the Editor of The Railway Gazette

Sir,—May attention be drawn in The Railway Gazette to a method of passenger train operation which if fully exploited at various points would greatly improve existing facilities between innumerable stations without incurring any increase of running costs? The system may be called "central interchange station operation."

The fundamental method of working would be the same as at interchange stations on the "Underground," where we find that a given train only stops sufficient time for passengers to unload and load and:—

(1) Is not timed to arrive at any specific time relative to specific trains upon other routes.

(2) Does not wait to make connections with or from specific trains on other routes.

The frequency of trains on the various routes provides automatically almost immediate connections to and from all points. Frequency of service is the vital factor. The fundamental simplicity of this method of working contrasts sharply with the highly complex methods at present to be found at main line junction stations, where certain trains wait for connections, and so on.

With suitable modification, the fundamentals of the above scheme could be advantageously adopted where conditions are favourable, for example, at Trent station on the L.M.S.R. Considering Trent as an illustration, the station would be enlarged so that all trains passing through the station, or near the station (on the loops), could be made to call in the station. This would completely interconnect in one station the following services:—

London and Leicester to Derby and beyond.
" " Sheffield and beyond.
" " Nottingham and beyond (via Trent).

Also:—
Derby to Nottingham.
Nottingham to Sheffield (via Trent).
Nottingham to Crewe (suggested new service over the existing lines).

Let us consider travel between a typical pair of stations on opposite sides of Trent. The scheme outlined would show the following advantages:—

(1) Without increasing existing train-miles, the number of connections per day between innumerable pairs of stations would be enormously increased.

(2) Without increasing train speeds, travel times would be decreased (*i.e.*, travel speed increased) where one or more changes are at present necessary, owing to the shorter wait when changing trains and (possibly) the smaller number of changes necessary.

(3) Relief of congestion at other stations.

(4) Alternative routes and services would be made available from the station at which the passenger changes (*e.g.*, to Sheffield—three).

(5) Greatly simplified travel for the passenger and simplified handling of traffic, especially at holiday times.

(6) Existing lines from Trent give direct access to almost all parts of the L.M.S.R.

(7) No train storage required.

(8) Same number of through trains as before.

(9) Improvement of service not merely local—a very striking improvement would be effected between widely separated stations.

(10) Improvement in service between many minor stations owing to improvement in "cross-country" travel.

(11) Still further interesting developments made possible.

Assuming all existing passing trains were stopped at Trent, the number of connections a day between Leicester and Nottingham would be increased by 75 per cent., as follows:—

Weekdays, Leicester to Nottingham, now	20 (approx.).
By stopping all passing trains at Trent ..	35 (").
Increase	15

The fact that there are already 42 trains a day from Trent to Nottingham would guarantee suitable connections. The value of this alone considered over a period of say 12 months would be enormous.

Owing to the deceleration incurred, difficulty might be experienced in fitting in a stop at Trent for the expresses. If that were the case the plan could be modified as follows: trains now terminating within a few miles of Trent would be extended as far as Trent to inter-connect. Owing to the small increase in train-miles a slight increase in running costs would be incurred, but when put into practice the scheme could include modifications to compensate for such factors. As a result of the striking and widespread improvement in service, passenger receipts would increase and the financial gain to the L.M.S.R. might be enormous.

Yours faithfully,
IVOR THOMPSON

The Price Issue

2, Bromley Common,
Bromley, Kent.
June 26

To the Editor of The Railway Gazette

Sir,—In Professor Jones' thoughtful address, reported in your issue of June 15, reference is made to three important problems of the present day. If, as he says, "the first business of an enterprise or industry is to make itself efficient," then industry ought to be completely freed from the specific task of providing livelihoods, and the co-operation of the trade unions would seem to be necessary to achieve this. Again, you report Professor Jones as saying that "it is the business of the nation to see that the fruits of efficiency are secured for the public." There will surely be general agreement about this, but it should be realised that its achievement must mean the abandonment of the wage system as the *sole* means of providing purchasing power, and the tapping of a supplementary source of income, so as to make available for consumption what the community is capable of producing but cannot at present purchase. His closing remark is that "the price problem is the problem of equity," but it is no use attempting to arrange any price system until it is certain that the total purchasing power in the hands of the public is enough to meet the total prices of industrial products for sale to the public, and we are therefore driven back to the two interlocking problems mentioned first.

Yours faithfully,
J. EWART PURVES

PUBLICATIONS RECEIVED

Steel Trails—The Epic of the Railroads. By Martin D. Stevers. 374 pp. 9¼ in. × 6 in. 48 half-tone illustrations and 7 pp. line drawings. Putnam & Co. 21s. net.—This is an extremely readable book. After the spate of literature which has issued from British publishing houses during the past few years, describing in a popular way the evolution, equipment and working of railways in this country—with casual reference to what goes on in other parts of the world—it is refreshing to have the same subject presented from the American angle, and, moreover, in typically American fashion. The author's method of description is, for the most part, the personally conducted tour, in company with the "men on the job," and not the least intriguing feature of the book, to an English railwayman, is to learn the equivalents, in American argot, of all the technicalities—and the commonplaces—of railway operation. Historically a most interesting study is given of American railway development. It is shown how all the earliest American railways were planned to give access to the waterways, such as the chain of the Great Lakes, the Erie Canal, the Mississippi; as late as 1850 Chicago, then a very small place, was served by Lake Erie and had not been reached by rail from the East; ten years later, so rapidly did railway construction then begin to take place, this great city of the Middle West had become "the hub of a railroad wheel with truly gigantic spokes," with three routes to the Atlantic, one to St. Louis, one soon to reach New Orleans, one to the Missouri, and three already to the Mississippi and pushing westward across Iowa. The author does not draw any veil over the remarkably casual, and, indeed, reckless methods of railway operation in America in early years. We read of the "grade crossings" of track over track on the level, unprotected with signals, and often the focus of fierce rivalries of competing railways, towards which trains would race with the deliberate intention of getting across first, until finally a terrible collision at the Grand Crossing, outside Chicago, in 1853, compelled the adoption of precautionary measures. It is curious, however, that while a species of block signalling came into use in 1865, interlocking in 1870, and the first track circuit as early as 1872, semaphore signalling was not standardised until 1897. These protections, save the last, did not come into general use immediately on introduction; on the contrary, by most railways, intent on further adding to their mileage, they were regarded as "unproductive expenditure." If America has lagged behind Great Britain in the matter of safety, however, as well as in the obstacles to efficient operation occasioned by the multiplicity of crossings "at grade," highway crossings in cities, and such notorious obstructions as the mile up the main street at Syracuse of the New York Central main line (now at length to be remedied), a study of this book shows that in other respects she is ahead. The marvellous mechanism of seat and berth registration, the minute care with which trains are prepared for their runs, the building up of train formations in proportion to traffic and the working of marshalling yards—all command admiring attention as we are conducted through the depots and the yards. Much more might be mentioned, but space forbids; the only criticism that we would advance is that a book at such a price might have included a good deal more by way of half-tone illustration, which would greatly have enhanced its value. This lack apart, we can but congratulate the author on having made a notable addition to railway literature; a study of his book, moreover, shows that there is plenty which we have still to learn in this country as to the perfection of the science of "railroading."

Opere Pubbliche: 1922-32, or I to X of the Fascist Regime. Published by Ministry of Public Works, Rome, 1933. 295 pp. 9 in. × 12¾ in., several folding plates and maps, preface, and index. Profusely illustrated. No price stated.—This handsome volume has been issued as a commemorative statement on the work accomplished in various fields of public activity by the Fascist Government during the first 10 years of its existence. The preface is contributed by Signor Araldo di Crollalanza, the Minister of Public Works, under the title of "A Ten Years Balance Sheet," from which it appears that the enormous sum of 24,709,000,000 lire has been expended on public works of one kind and another in the years in question. This seems all the more extraordinary when one reflects that in the 60 years preceding the accession to power of the Fascist party, the total figure for similar expenditure came to 21,536,000,000 lire only. These funds have been devoted to numerous classes of work, including the construction of railways, roads, and docks, irrigation systems, aqueducts, town-planning works, hydro-electric power schemes, drainage systems, and the reconstruction of areas damaged by the war or earthquakes. Railway construction during the period is represented by 476 km. of new State lines—109 km. of which is narrow gauge—and 2,394 km. conceded to private undertakings, while at October 28, 1932, there were 447 km. of State lines under construction, of which 30 km. were narrow gauge, and 859 km. of lines intended to be worked by private concerns were also building. The sums expended for these purposes then amounted to 5,340,324,972 lire. In spite of road and motor development, it is considered that railways will continue to hold a specially important place in transport in Italy, owing to the configuration of the country, which is not so favourable to the expansion of road traffic as it is in many other parts. The volume contains concise but comprehensive accounts of the various sections of new lines and electrifications, accompanied by an excellent series of photographs, some of which have already appeared in our columns, and maps. There is also a diagram of the works, buildings and equipment used during the construction of the Apennine tunnel on the Florence-Bologna *Direttissima*. The light railways, tramways, and lines conceded to private enterprise, are dealt with separately in a short section. Unfortunately there is given no general railway map of the country, making it difficult to tell how the various sectional maps connect with one another. The remaining parts of the book are fully as interesting as the railway section, and the whole forms a useful record of a remarkable national effort in Italy.

Birkenhead.—An illustrated booklet and folder outlining the industrial and commercial facilities of Birkenhead have been published with the authority of the Birkenhead Corporation and Chamber of Commerce. These publications appear at an opportune moment, for the new road tunnel under the River Mersey, which will give the town and its docks direct communication with Liverpool, Lancashire, Yorkshire, and the manufacturing centres of the North, is to be opened in July. It is emphasised in the foreword to the booklet that Birkenhead offers the unusual combination of ready access to the sea, good and cheap transport and public services, and low rates. The succeeding pages deal with these advantages in detail. Birkenhead docks and the shipping lines serving them, railway routes, inland waterways and local industries, all receive attention, and from the comprehensiveness of their facilities it seems likely that a new era of prosperity for the town will set in when the Mersey Tunnel breaks down the water barrier that has hitherto tended to isolate it. The folder that accompanies the booklet illustrates the Birkenhead entrance to the new tunnel on its front cover, and deals principally with the industrial and shipping potentialities of the town.

A Memorandum for the Use of Business Visitors to Canada.—Prepared by H.M. Senior Trade Commissioner in Canada and Newfoundland, Mr. F. W. Field, C.M.G., and published by the Department of Overseas Trade this month, this booklet contains many useful items of information for the intending visitor to Canada. Under the heading "Travel" is an itinerary from ocean to ocean, showing all the principal cities, distances and times taken for the journey, together with information as to fares, sleeping and day accommodation, luggage, restaurant car tariffs, hotels, and even tips. Such matters as coach services, suitable clothing, steamer services and passports are also touched upon. In addition, there are interesting notes upon population, customs' tariffs, newspapers and industry.

THE SCRAP HEAP

Owner of Old Car: "My price, sir, includes everything you'll need—even road maps."

"And what about a railway time-table?"—*From "Tit-bits."*

* * *

"Please, teacher, what's collision?"

"A collision is when two things come together unexpectedly."

"What, like when mother had twins?"—*From the "B.E.N. Monthly Bulletin."*

* * *

TRAVELLING ON THE CANTERBURY & WHITSTABLE RAILWAY

Whitstable is five miles only distant from Canterbury, to which place there is now a railway for the conveyance of pasengers. They are taken in a kind of omnibus, ascending two miles by a conducting rope from a steam engine, carrying behind them the empty coal carts, and when drawn up the first hill, they are detached from the machine and sent down an inclining plane, till they arrive at the ascent of the second hill, going with a most frightful velocity, to those unaccustomed thereto, being nearly a mile in a minute—when you are again dragged by the engine up the ascent as at first, passing through a tunnel of above three-quarters of a mile in complete darkness, and you again descend the hill, entering Whitstable by the same way as before. This is a journey very expeditious, but requires strong nerves, particularly for ladies. The fare is only sixpence.—*An Account of travel on the Canterbury & Whitstable Railway in its early days in "The Steam Packet and Coast Companion or General Guide," by F. Coghlan, undated, published by H. Hughes, St. Martin's le Grand.*

* * *

The following is an account by a correspondent of an Indian travel experience of about 30 years ago:

At midnight I went to Deoghur station trusting that the local Deoghur Baidyanath Railway would prove equal to the task of getting me as far as the East Indian Railway station. The train from Deoghur was timed to start at 12.25, and as the E.I. station was only six miles off it was reasonable to suppose that it would catch a train timed to leave the E.I. station at 1.49 with something to spare; but, when at 12.20 there was no sign of any life at the Deoghur station, I began to get anxious and sent for the driver of the engine, which was in a siding, to know if he intended starting. He sent back word that he started sometimes at 2 o'clock and sometimes at 3 o'clock or whenever he got an order from the *bara* babu*. I then set about finding the *bara bubu*, but word was back that he was not at his home. I and my tour clerk then knocked at the door of a house which we were told was occupied by a *chota babu** and at length succeeded in inducing him to come out. He said that it was the stationmaster's business to start the train, but, as the stationmaster had disappeared, he at length consented to start the train himself.† The station was in complete darkness and no coolies were in attendance. Before the train started at about 12.50 a cry was raised, "Where is the guard?" A search was made for this official and he was discovered sleeping comfortably between two bales of goods in the waiting shed. The driver, who seemed a bit of a character in his way, kept protesting loudly that this railway had no *mâ bâp*.‡ Our troubles did not end after the start had been accomplished, as there were three stops of ten minutes each in the six mile journey to enable the engine, which was leaking, to get up fresh steam. I caught the express by a few minutes at Baidyanath, but there was not time to book all the luggage and a box of office records did not reach Sahebgunj until the following evening.

[The little railway referred to was then owned and worked by a private company, but was shortly afterwards absorbed by the Indian State Railways system. Needless to say, such happenings could not have taken place since the absorption.—ED. *R.G.*]

* Literally "big babu" and generally used to denote "Head Clerk," but in this case, the Stationmaster.

* "Little babu," probably "booking clerk."

† This would probably have been done only for an important Government official.

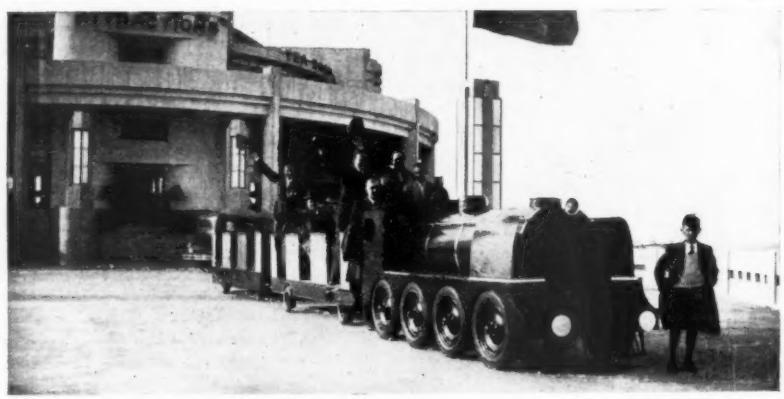
‡ Literally = no "mother and father," meaning it was no one's child.

* * *

RED TAPE FOR TRAVELLERS

The consternation caused among the authorities of Eton College when the Great Western Railway secured powers to construct a branch line to Windsor, and the measures proposed to ensure that the scholars should be saved from yet another conspiracy to divert their attention from their books, are as familiar as the paradox which claims for the same institution the honour of having been the scene of the British victory at Waterloo. It may be less well known that Oxford for similar academic reasons was equally opposed to invasion by the Great Western Railway.

It was not until 1843, after three rejections, that the Oxford Railway Bill received University blessing and the Royal Assent, and even then not without the insertion of certain clauses for the due preservation of University discipline. One clause empowers the Vice-Chancellor, Proctors, Pro-Proctors and others to have free access to depôts, stations and trains to obtain such information as may be required by them as to persons applying to pass on the railway who shall be members of the University or suspected of being such. The penalty for not furnishing the information was to be forfeit of a sum not exceeding £5 for each default.



A new mystery engine which has made its appearance among holidaymakers at Blankenberghe Pier on the Belgian Coast. The driver sits inside the boiler and steers through peepholes in the dome

A second clause prohibits the railway company from carrying a member of the University who has not taken the Degree of Master of Arts or Bachelor in Civil Law if the officers of the University shall require the company not to so convey him, while a further clause enacts that it shall be unlawful for the company to take up and set down any member of the University below the degrees above indicated except at regularly appointed stations of the line. Incidentally, it may be added that the railway company was empowered in this Act to make regulations (*inter alia*) for preventing the smoking of tobacco in their carriages, stations or premises, but in view of the number of the members of the University patronising the railway and the difficulty of enforcing the regulation it was more often honoured in the breach than in the observance.

OVERSEAS RAILWAY AFFAIRS

(*From our special correspondents*)

Petrol railcars for service in Spain—New railways for France and China—Inchcape scholarships for British residents in Argentina—Suburban train collision near Paris—A year of progress and increased net revenue in New Zealand

ARGENTINA

The Inchcape Memorial Scholarships

The Buenos Aires Centre of British Engineering and Transport Institutions having learned from the British Embassy that the Foreign Office approves of the scheme, has now published the conditions governing the Inchcape Memorial Scholarships in Engineering at Glasgow University for sons of British residents in the Argentine Republic, which are being offered by Lady Effie Millington-Drake (a daughter of the late Lord Inchcape) and her husband, the present British Minister in Uruguay. There will be two scholarships, a major one of £250 a year and another of £150, for boys between the ages of 16 and 19, for a duration of three years, with a view to obtaining the Certificate of Proficiency in Engineering. The first examination will be held at Buenos Aires in July, and it is unnecessary to add that much interest has been aroused by the offer, especially among railway engineers who have sons of the requisite age.

SPAIN

Railcar Service on the Central of Aragon Railway

The Central of Aragon Railway Company introduced a petrol railcar service on April 25 between Caminreal Junction and Calatayud. On the outward journey from Caminreal, the car connects with the Valencia-Zaragoza (Saragossa) express in place of the former light branch line train hauled by a steam locomotive. In the reverse direction the car replaces a slow mixed train. That the service has been a success is shown by the fact that in the ten weeks prior to its inauguration, the average number of passengers a day from Calatayud to Caminreal was 41, and in the same period after the introduction of the railcar the average was 58. In the opposite direction, the corresponding averages were 55 and 76. The public has given a warm welcome to the new method of traction and many requests have been received for stopping places to be established at a number of level crossings situated at convenient points.

The car is highly economical in operation, and is equipped with two Ford engines, of the road lorry type, with mechanical transmission acting separately on the two axles. Each motor is used for running in one direction only. The interior of the car is pleasing and comfortable, and seating accommodation is provided for 48 passengers. The body is of all-metal welded construction, and was constructed at the Rolling Stock Construction Company's works at Zaragoza, which firm is the licensee for the German patents covering the principal components of the vehicle. Three cars have also now been ordered by the M.Z.A. Railway from the same builders.

THE FAR EAST

Passports for China

It is announced that the Chinese authorities are notifying shipping companies that foreigners should not be booked for China unless they are provided with passports properly vised. At one time British passports endorsed for China were sufficient for passengers entering the foreign settlement at Shanghai. Now a Chinese visa is required in addition. Passengers via Canada wishing to call at places in Japan should see that they have a Japanese visa, otherwise they will not be allowed to go ashore at the Japanese ports. A transit visa is all that is required for one visit, but for a longer stay an entrance visa available for one year is required.

Canton-Hankow Railway to be Finished in 1936

In order to bring the South-Western provinces into closer contact with the Central Government, the Ministry of Railways has decided to reduce the period allowed for the construction of the unfinished section of the Canton-Hankow Railway by one year. The line, which was originally scheduled to be completed by the end of the 26th Year (1937), will be open to traffic at the end of the 25th Year (1936). Consequently, work is now being carried out not only from both ends of the remaining Shinchow-Chuchow section but also on three subsections south of Hengchow in southern Hunan. Arrangements are also being made to start work between Lokchong in northern Kuangtung and Pashihtu in southern Hunan along the border between the two provinces. With regard to the funds needed for the completion of the railway, construction expenses will be provided from the loan arranged with the British Boxer Indemnity Refund. Reports current in Shanghai that another loan will be concluded for the railway are incorrect, nor has the loan already secured anything to do with the Lunghai Railway.

Canadian Sleepers for Chinese Railways

Canadian creosoted sleepers are now arriving in China for use on the Canton-Hankow Railway. Sleepers of this type have a life of about twenty years and are very suitable for Chinese requirements. The price of delivery of Canadian sleepers in China has been rather against their purchase, but with the alteration in the exchange value of the Canadian dollar in relation to the Chinese dollar trading has become possible. Australian redwood sleepers have been used on the Nanking-Shanghai Railway for many years and have proved very satisfactory.

Canton-Kowloon Railway Agreement

The question of revision of the Canton-Kowloon Railway agreement is not yet settled and the Chinese are seeking to open the discussions again. The present division of the profits is in the ratio of 65 per cent. Chinese and 35 per cent. British in accordance with a contract entered into years ago. The Chinese proposal is a revised ratio allowing 75 per cent. Chinese and 25 per cent. British in the division of the profits of the undertaking. The Chinese section of the railway is 88 miles long and the British section 22 miles. No doubt there are many other considerations beyond that of mileage to be considered in dealing with the alteration of the existing agreement.

Lunghai Railway

Construction on the Tungkuan-Weinan section of the Lunghai Railway has been started. The work will take about a year to complete.

The Lunghai Railway Administration has suggested to the Ministry of Railways a change in the alignment for extending the line. Instead of carrying the railway westward to Lanchow, it is proposed to run southwards from Paochi to Chengtu, thus connecting the provinces of Szechuan and Shensi with Lienyun Harbour. This proposal has been approved by the Ministry. Survey work will be carried on with the assistance of aeroplanes, and $300,000 has been allotted for survey expenses.

Special Trains and Private Cars on Chinese Railways

Revised instructions have been issued by the Ministry of Railways concerning the use of, and charges for special trains and private or reserved coaches supplied for public use on the railways. Certain

defined rules are laid down under which such facilities will be provided free of charge or at special rates. These apply to the higher Chinese officials and to foreign representatives of high rank under certain conditions. In all other cases the full charges will be made for the provision of special coaches and trains.

FRANCE

New Railways (*a*) in Eastern France

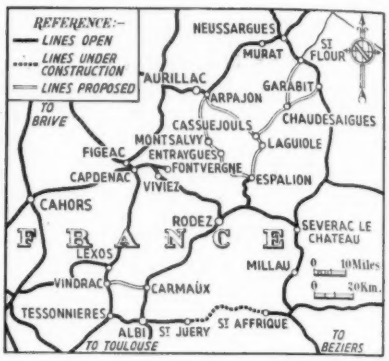
Notable railway construction is at present in course of execution in various parts of France. In the east, the Vosges mountains have hitherto remained a barrier to railway communication, chiefly, no doubt, for strategic reasons, over a distance of 60 miles, from the passage through them at Saales of the Epinal-St. Die-Strasbourg line to that of the Belfort-Mulhouse main line. Now, however, St. Maurice, on the Est system, and Wesserling, on that of the Alsace-Lorraine Railways, are being connected by a new route which will shorten the existing journey (via Lure and Belfort) from Nancy and Epinal to Mulhouse, Basle, and beyond by 33½ miles.

This involves boring through the Vosges by a tunnel 5¼ miles long, beginning immediately to the east of St. Maurice. Owing to the importance of the route, the tunnel is to be double track, 31 ft. in width. Contrary to the usual practice, this tunnel is being pierced from one side only—the eastern—and will be throughout on a gradient of 1 in 125, rising from an altitude of 1,575 ft. at the eastern portal to 1,805 ft. at the western end. At its deepest point, the tunnel will pass 2,300 ft. below the summit of the Tête des Neuf Bois, which is 4,035 ft. above sea level. Work on the tunnel has now been proceeding for about twelve months.

Further north the Alsace-Lorraine Railways are about to carry out another scheme, for a line from St. Marie-aux-Mines, at the extremity of a branch from Sélestat, to a point near St. Die, on the Strasbourg-Epinal line, which will involve a tunnel 4¼ miles long under the Vosges, and is expected to require four years for its completion.

(*b*) In Central France

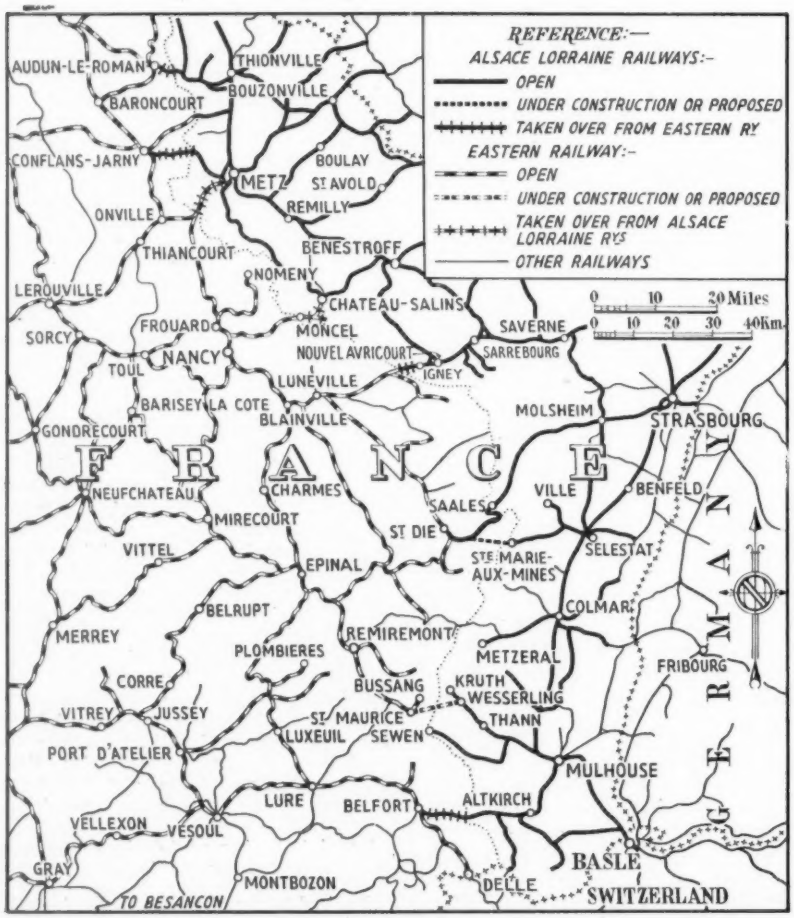
Other schemes are in course of realisation in the *massif* of Central France, linking up the lines of the Paris-Orleans-Midi Company from Neussargues, in the north, whence a Midi trunk line proceeds due south to Millan and Béziers, while a P.O. branch proceeds south-westwards to Figeac, there to join the P.O. Brive-Capdenac-Toulouse line. The intervening country, which is of great difficulty from the engineering standpoint owing to the profundity of its valleys—the gorges of the Truyère, the Lot and the Tarn in particular—has hitherto been badly provided with railway communication. The only lateral link between these two routes has been that commencing at Sevérac, on the former, and proceeding westward to Rodez, from which one branch carries on north-westward to Capdenac, and the other southwestwards to Albi and Tessonières, on the P.O. Capdenac-Toulouse line.



Proposed new lines in Central France

Several towns in this region, hitherto, have been from 20 to 25 miles from the nearest railway station. A new line from St. Affrique westwards to St. Juèry, near Albi, is now practically complete; it has involved 43½ miles of new construction, chiefly in the valleys of the Dourdou and the Tarn, and including a considerable amount of tunnelling and bridging. Heavy damage was done to the works by the floods of March, 1930, but this has been made good. From Carmaux, to the north of Albi, the Midi Company has obtained a concession to build a line, 17½ miles in length, to Vindrac, another station on the P.O. Capdenac-Toulouse line. The traffic from Carmaux, hitherto worked through Albi, will on the completion of this section, be carried to the north and west via Vindrac, and the lay-out at Vindrac station will be modified accordingly.

Until now the north of the Aveyron department has been entirely without railway communication within the triangle whose base is Capdenac-Espalion-Sevérac, and whose apex is Neussargues. In 1922 a line was projected from Espalion to St. Flour, but the plan was postponed owing to the unfavourable economic situation. Since then proposals have been formulated to connect Espalion with Aurillac, by either of two routes, one going direct



Sketch map showing new railways in course of construction through the Vosges, and also the Alsace-Lorraine and Est exchanges of line which took place on January 1 last

via Entraygnes and Montsaliz—which would involve a climb of 1,640 ft. between the two towns last-mentioned—and the other to serve jointly as a route to both Aurillac and St. Flour, as far as Cassuèjouls, where it would fork, the easterly fork being carried on to St. Flour, or more directly to Garalit, adjacent to the famous bridge of that name across the Truyère gorge. This line would be almost entirely in the Truyère valley. But in any event, owing to the barrenness of the region, the lines, which would be very costly to construct owing to the nature of country, would probably be worked at a deficit, and it is therefore unlikely that these Aveyron projects will be carried into execution.

Paris Railway Accident

A crowded suburban train from the St. Lazare terminus collided with an empty goods train standing on the line between La Garenne and Houilles about eight miles from Paris at 10.45 on Sunday night. The driver of the passenger train was killed and a number of persons injured. An inquiry into the cause of the accident was immediately begun by M. Grenier, examining magistrate of the Versailles court, where the news was received soon after midnight. The magistrate and two of his colleagues arrived on the scene while the injured were still being removed.

The suburban train, which was composed of steel coaches was of the "push-and-pull" type in which the locomotive is always at the Paris end of the train to avoid loss of time in shunting at the terminus, the driver occupying a control cab in the front coach.

The first results of the inquiry, according to *Le Matin*, show that the driver duly stopped the train when he encountered a colour light signal against him. He is said then to have proceeded slowly with the train under control ready to pull up in a few yards, or to resume normal speed if a signal showed line clear as required by the regulations. Apparently he resumed speed too soon and collided with the goods train.

QUEENSLAND

Traffic Activities

Seasonal conditions during the past few months have been very favourable with the result that a record sugar season was experienced, while one of the largest cotton crops ever gathered in Queensland is now being picked. The wool, wheat and cattle traffic have also been active. Recent experiments in the shipment of chilled meat to Great Britain have stimulated interest in this industry, and, as a result of a recent visit of Sir Edmund Vestey to Queensland, considerable alterations are being made to certain meatworks to provide facilities for the chilling of beef. The Railway Department is also altering a number of wagons for the carriage of this special traffic, which must be hung in iced wagons during transport from the meatworks to port of shipment.

Engineering Works and Staff

Several extensive regrading and relaying works have been authorised during the past year and are now being proceeded with. The sections affected are principally between Gympie and Maryborough on the main coastal line and between Charters Towers and Hughenden on the Great Northern Railway, the latter to facilitate the movement of traffic to Mount Isa.

Full time working has been restored at the whole of the departmental workshops during the past week, but continuance beyond the end of June is at present uncertain. Railway employees throughout Queensland were gratified recently to receive from the Government a refund of 5 per cent. of the accumulated superannuation deductions which were not returned at the time the scheme was abandoned.

NEW ZEALAND

A Year of Progress

The complete figures for the New Zealand Railways financial year (ended March 31, 1934) have just been announced. These show that the total revenue was £6,331,935, and the expenditure £5,246,365, giving a net revenue of £1,085,570. This is an increase of £235,026 over the net revenue in the previous financial year.

The passenger revenue amounted to £1,336,329, an increase of £129,033 over the previous year's figures, this improvement vindicating the Board's policy of fare reductions. Holiday excursion fares available all the year round have now been in operation for 2½ years, so that an increase in revenue to this extent indicates a substantial increase in the number of passengers carried, and passenger revenue for the latter half of the year under review has actually been higher than before the reduction in fares was introduced. Goods revenue increased from £3,745,777 to £3,911,245, or by £165,468. The improvement in freight traffic has been a constant feature of the year's work, the principal increases coming from the primary industries. Farming products accounted for over £100,000 of the increase. The net revenue earned by the railways was £364,078 in excess of the Government's budget estimate, thus relieving the demands on taxpayers to that amount.

New Wagons for New Traffic

How new commercial developments may favourably affect railway traffic is seen in the success attending the first shipment from New Zealand of chilled beef for England a few months ago. Following the announcement that the beef turned out in excellent condition, special arrangements had to be made by the railways here for expeditious transport in special vans to handle the new traffic, which is expanding rapidly. These vans have been built in the railways workshops to the department's new design. The shippers have expressed satisfaction with the efficiency of these bogie vans for the purpose, and with the prompt despatch effected throughout in dealing with this new trade. Beef prices, which had been very low owing to glut conditions in the ordinary frozen meat trade, immediately rose when the chilled beef process was found to give such satisfactory results.

Train Control Extensions

The most recent area brought under modern train control on the New Zealand Railways is the Marton-Wanganui Stratford-Okahukura section, a distance of about 200 miles. This completes the chain of train control centres using selector telephones with microphones and loud speakers at control offices thus giving immediate verbal contact with all stations to facilitate the movement of trains and distribution of rolling-stock. At central control offices all train movements are diagrammatically checked as they occur and every movement is planned ahead to suit the needs of the general scheme of traffic operation. This type of train control now applies to all parts of New Zealand where there is any density of traffic, and its application has resulted in greatly improved time-keeping by the principal trains and much better results in wagon user.

Local Excursion Clubs

An interesting development in New Zealand is the extent to which excursions, organised by clubs in the various centres, have grown. Taking advantage of the tariff regulation which gives organised parties, travelling in large numbers, return excursion rates that work out at less than a halfpenny per mile of travel, for one or two day outings, several enterprising clubs have organised parties ranging from three hundred to four thousand in number for visits to favourite localities. For instance, the activities of the Corsair Social Club, Christchurch, in promoting excursions by rail, have resulted in 24 special trips between 1927 and March 31, 1934. The various special trains arranged for these excursions have carried a total of 609 children and 12,165 adults, and have returned a net revenue of £6,789 to the department. The secretary of the club is a railway employee with a flair for this kind of organising.

The majority of the patrons have been people who would not have been able to afford the expense nor secure the necessary leave from their work to undertake longer visits than those arranged for these week-end outings. In addition to the low fares, meals, side trips, &c., were also arranged at reduced rates, and each of these organised excursions was personally conducted. In view of the success of these excursions, the railways themselves will take the initiative and promote such outings, where no such organisations by clubs exist.

AIR CONDITIONING OF TRAINS—I

In the first of this series of articles, methods for regulating the temperature, humidity and purity of the air in carriages are briefly described

By STUART MIALL, B.Sc.

IT has long been common practice to heat trains in cold weather prior to their departure from terminal stations by coupling the steam heating pipes up to a stationary plant or to a shunting locomotive. After departure of the train the locomotive, of course, supplies the steam necessary. In the U.S.A., where great heat is experienced during the summer, the system has of late years been extended so that trains are pre-cooled before passengers board them for long journeys. This has more recently been developed by installing a system of keeping the trains cool on their journeys. Not only so, but the ventilation of the cars is so controlled that "conditioned" air, as it is called, is supplied continuously at a predetermined temperature and such a humidity as to prevent condensation on the interior surfaces. The rate of circulation of such air, and the amount of fresh air added, depends, of course, on the number of passengers travelling in each car. Air-conditioned cars must have what are ordinarily openings to the outer air, such as windows, hermetically closed, and the doors, too, must fit tightly and be kept shut, and be as few as possible. The only source of admission of air to the car must be by way of the ducts from the conditioning plant. The used air, too, must be extracted and passed through a single passage back to the plant, so that its coolness may not be wasted and so that to it may be added as much fresh air from outside as may be necessary to replenish the oxygen required for human respiration. The ratio of fresh air to recirculated air is 1 to 3 in the American cars.

The refrigeration load, *i.e.*, the rate at which heat must be extracted from the air to keep it cool, is obviously dependent upon the rate at which heat is being taken up by the air. Much heat comes from human bodies, and, in dining cars, from heated food. On very hot days the fresh air which is taken in brings a considerable amount of heat with it. Lastly there is the inflow of heat from outside by conduction and radiation through the roof and sides of the car. This influx can be greatly diminished by the use of heat insulating materials, and the refrigerator apparatus can be reduced in size considerably where the roof and walls are lined with 2-in. cork or other efficient insulating material having the joints sealed to prevent air circulation, and where the windows are double glazed.

The refrigeration load, and hence the capacity of the apparatus used, can also be lessened by a judicious selection of the filters needed for cleansing the incoming and recirculated air. In America curled-hair filters are largely used. Oil filters are eminently suitable for the same duties, but cleaning the air by a water spray is a practice to be avoided. Such sprays lead to the complete saturation of the air at a relatively high temperature, when its ultimate vapour content can be considerable. Cooled air will not hold so much vapour as warm air, so that the refrigerator dealing with warm saturated air inevitably precipitates moisture. But the condensation of water vapour leads to the liberation of heat at the rate of approximately 1,000 B.T.U. for every pound condensed, so that the heat extracting capacity of a refrigerating plant to deal with saturated air must be appreciably greater than that of a plant to deal with air of moderate humidity. The great advantage of hair and oil filters is that they do not increase the moisture content of air to be cooled.

Cooling may be accomplished in a variety of ways. The most obvious is to use ice as a refrigerant, but there are practical difficulties in the supply of sufficient ice for long journeys, and in its bulk. However, in Great Britain, extremely high air temperatures are rarely experienced, and the ice required for a long journey would usually be far less than that necessary in America. In view of this fact, and in view also of the fact that air cooling is not required at all on most days of our spring and summer, the relatively simple expedient of carrying ice would appear to meet with home requirements under all but the most exceptional conditions. To cope with the latter, resort might occasionally be had to the use of Drikold instead of ice. This substance, which is nothing more than solidified carbon dioxide, has a greater cooling effect pound for pound than ice.

For the American alternative of carrying a power-absorbing compressor type refrigeration plant there would not appear to be any justification in this country. Such plant would be out of use for the greater part of the year, and, being distinctly expensive in first cost, it would seem to be an extravagance rather than a warrantable form of luxury.

The load equivalent of air conditioning

Except where compressor plants are driven by their own oil or petrol engines an extra load is put upon the locomotive, and American experience shows that a 15-car train may have to be cut down to a 13-car one where mechanical refrigeration is employed. The alternative steam-jet system of refrigeration taxes the boiler capacity of the locomotive instead of the hauling capacity, but this may lead to the same necessity for lightening trains working to a tight schedule.

As in America, so in the warmer Dominions and Colonies, it may prove advisable, notwithstanding the above-mentioned drawbacks, to obtain the desired refrigerating effect by drawing on the power or the steam of the locomotive. So far there does not seem to be any marked superiority of one system over the other, and consequently both compressor and steam-jet systems must be considered.

In the former the cooling effect is produced by passing a substance such as ammonia or methyl-chloride round a reversed heat engine cycle. By means of the compressor the pressure on the fluid in a nest of tubes is diminished so that it boils at a sub-atmospheric temperature. This pressure reduction is effected and maintained by drawing off vapour from the nest. The latent heat of evaporation comes from air which is circulated through the nest on its way into the car, and it is this particular abstraction of heat which directly enhances the comfort of passengers. The vapour drawn off is compressed to a relatively high pressure and temperature, and it is passed in a partially condensed state to a second nest of tubes outside the car, which is maintained by fans at a temperature but slightly above that of the external atmosphere. The compressed vapour condenses completely in this second nest, and, after it has reached atmospheric temperature, it is passed

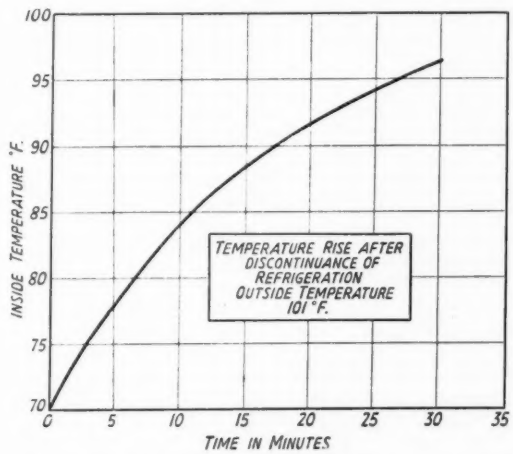
through a pressure reducing or throttle valve into the evaporating nest, where it is ready to go through the cycle again.

Ammonia is the ideal substance for the cycle described, but, as its effect on passengers in the event of its escape might be unpleasant, its place has to a large extent been taken by Freon—a non-toxic refrigerant known also as F.12, and having the chemical formula C Cl_2F_2 (dichlorodifluoromethane).

In many American cars the compressor is driven by a 10-h.p. 32-volt electric motor, taking its energy when the car is in motion from a 15-kW. axle driven generator, and, when the car is stationary, from a battery. For precooling the train, and for keeping it cool during extra long stops, the motor is plugged in to a main supply on the station. Direct drive compressors cannot be used for precooling, and their effect is usually below the requirements when the train speed becomes less than 30 m.p.h..

The refrigerant used in steam jet plants is plain water, which is cheaper than Freon and, of course, non-toxic. Water will boil, and extract its latent heat of evaporation from the air at very low temperatures, if the pressure on it be sufficiently diminished. In the steam-jet plant air and vapour are removed from a closed system partly filled with water by a steam ejector. The water is kept moving round pipes in contact with air to be cooled, and, being in a state of ebullition, it readily absorbs the heat which would otherwise be a source of discomfort to passengers.

The steam-jet system is operative when the train is standing with an engine attached, but the precooling of trains is possible only where there is a steam supply available before the locomotive arrives. The changing of locomotives interrupts the working of the jet type of plant, and in very hot places there may follow a considerable rise in the car temperature if this operation takes more than two or three minutes. The accompanying illustration, taken from an article by Mr. L. J. Verborg (Supervisor of power plants, Missouri Pacific Lines) in the *Railway Mechanical Engineer*, reveals the importance of continuous refrigeration in regions where very high outside temperatures are encountered.



Curve showing speed at which temperature rises in passenger car after discontinuation of cooling

Photo] ***The engine of the Torbay Limited being turned at Kingswear, Devon. The locomotive is the 4-6-0 "King George IV," No. 6003*** [*G. L. Walker*

SECOND REPORT OF THE POPE ECONOMY COMMITTEE UPON INDIAN RAILWAYS

This report suggests methods by which efficiency can be improved and economy effected, including a section on methods of increasing earnings on Indian railways

IN the autumn of 1932, the services of Mr. F. A. Pope, of the London Midland & Scottish Railway, were lent to the Government of India, to enable him to go to that country as Chairman of an Economy Committee, the members of which were officers selected from the four State Railways, excluding Burma. After touring the Great Indian Peninsula system during the cold weather of 1932-33, the committee in March, 1933, issued its first report, a summary of which was published in THE RAILWAY GAZETTE of May 19, 1933. Mr. Pope, who had returned to England in that spring, again went out to India last autumn (1933) and, as a result of the re-assembled committee's deliberations, its second report has now been published. The recommendations made are directed towards improving efficiency and effecting economies upon the four State lines, the North Western, East Indian, Great Indian Peninsula and Eastern Bengal Railways. Though naturally these recommendations apply primarily to those systems, there is much in them that can be adapted to apply to other Indian railways, and to Dominion and Colonial railways throughout the world.

Job analysis is the first subject dealt with in the report, and it is significant that, as a result of the committee's earlier recommendations, in the short period, April to December, 1933, a conservative estimate of the annual savings so far proposed on the four railways amounts to as much as Rs. 43 lakhs (£322,500), and already about one-third of this saving has actually been effected. The committee also advocated several other economy schemes, such as the laying up of locomotives, savings in train-mileage and capital expenditure, against which no definite monetary saving is as yet assessable. In passing it may be noted that three of the appendices to this second report take the form of additional examples of job analysis covering signalling, trackwork and graphical methods of analysis. In regard to office economies, the committee is of opinion that even in India mechanical accounting and statistical compilation should be extended and better office equipment provided, and that officers from Indian lines should be sent to England on deputation to study modern methods, so that on their return to India they may form the nucleus of a specialist body to guide railway administrations in these matters.

More Intensive Use of Locomotives

Perhaps the most important section of the report is devoted to a statement of the different aspects of the policy of intensive use of locomotives. Trials on the G.I.P. Railway have proved that a B.E.S.A. passenger locomotive could be run 13,256 miles during the month (December, 1933), or an average of 441 miles a day, day in and day out: a mileage of 20,000 a month is now aimed at to demonstrate what is possible with B.E.S.A. engines, of which there are over 8,000 in India. Subsidiary to this question is the all-important problem of bearings, and the report stresses the necessity of greater attention to, and the keeping of systematic records of them, so as to prevent the perpetuation of faulty designs. At the present time there are some 600 locomotives laid up, owing to lack of traffic on these four State lines alone, involving heavy interest losses and preventing free research into up-to-date developments. As a result of intensive usage, this position is not improving. The committee therefore recommends the scrapping of complete types of relatively inefficient pre-B.E.S.A. types of locomotive and also pooling on a large scale. Improvements in diagramming are suggested, among them being those outlined in THE RAILWAY GAZETTE of October 20, 1933. Many other useful recommendations, too numerous to detail here, are also made.

Increased use of coaching stock is dealt with on somewhat similar lines: On the G.I.P. Railway some 110 units of stock have already been released with corresponding savings in capital at charge and in maintenance: Appendix E indicates the results obtained. Specialised concentration of manufacture at economical centres, standardisation of workshop accounting to analyse production costs, and generally intensive use of machinery and appliances are advocated. Improved methods of recording and stencilling wagon repairs at out-stations are also suggested to enable the cost of these to be added to that incurred in main workshops so as to ascertain what are uneconomical types of wagons. Pooling of resources as between railways—which is simplified in India by standard parts and types—is not the least of the committee's recommendations. Other points raised are the substitution of oil for steam pumping plants, improvement in accounting for expenditure on train lighting, inter-departmental co-operation in the early supply of stores, the accounting organisation in relation to the railway organisation as a whole, handling at break-of-gauge transhipment stations and travelling without tickets.

Better Salesmanship Advocated

Another important section of the report discusses avenues through which the business or commercial side of railway working in India may be improved. Too much attention cannot, the committee considers, be paid to salesmanship, advertising and publicity. To this end the report urges the selection of only the most competent men as Divisional Commercial Officers and the careful choice of traffic canvassers, who should be relieved of all other work. Flying canvassing squads are also suggested to ascertain details of originating traffic, its radius of distribution, and what can be done to increase it. In this connection the committee expresses the view that suitable timetables may be of equal, or even greater importance than suitable fares. Meanwhile, wider freedom from routine duties for stationmasters—often the best canvassers—is advocated in the report, to give them every opportunity for canvassing. Dealing with advertising, the committee recommends greater commercial scope for central publicity, in the direction of keeping in close touch—through the medium of the Indian Trade Commissioners in foreign countries—with the import and export trade, not only of India but also of her competitors in world markets. The internal publicity and advertising should be left to individual railways, the staffs of which should be specially trained. Useful suggestions as to the lines that these staffs might follow are also advanced, and several examples of commercial activity on the L.M.S. are quoted. The committee recommend that the commercial organisation and personnel should be overhauled, an intensive campaign

started to attract traffic, and that commercial research units should be set up.

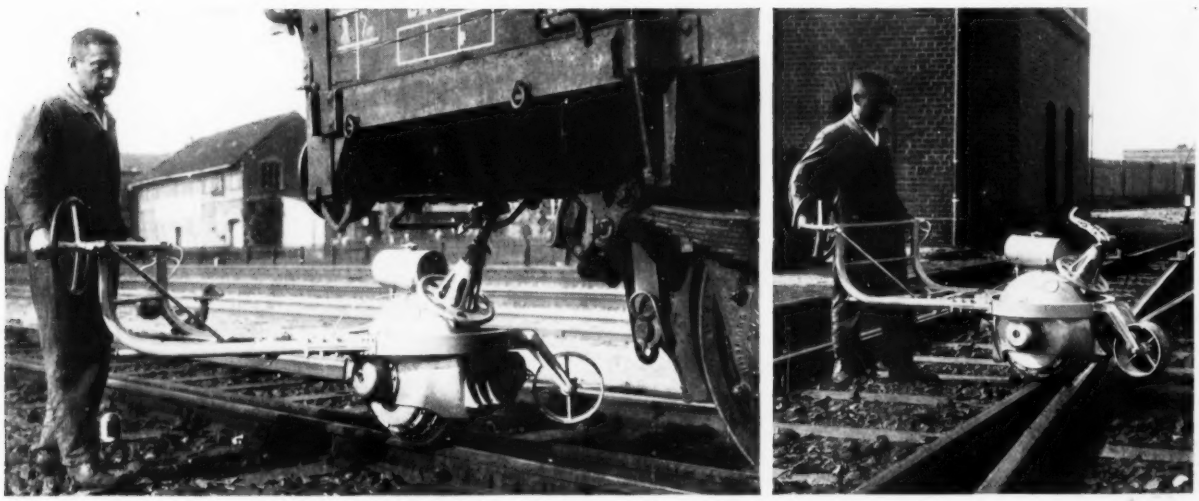
After dealing with the report of the Railway Retrenchment Sub-Committee, the report concludes as follows:—

"Without claiming for the subjects dealt with in this report any great novelty, the Committee feel that these matters have not been fully explored in the past, and they are confident that concerted actions on the lines recommended will be followed by beneficial results." The committee wish to reiterate what is stated in the concluding section of their first report (page 44) that efficiency and economy can only be obtained "by constant organised research and investigation . . . and that no saving is too small to be ignored."

An editorial note upon this report will be found on page 1125 of this issue.

A GERMAN "ONE MAN" SHUNTING MOTOR

THE problem of providing shunting power in places where the volume of traffic does not warrant the maintenance of a locomotive, or where the use of a locomotive is inconvenient for other reasons, has been solved in a novel manner by the German State Railway. The solution takes the form of a small petrol-driven "pusher," which is guided by hand in the manner of the familiar motor lawn-mower, to which, as will be seen from the illustrations, it bears a resemblance. A machine of this type, known as the Ilo, has now been in use for some time for marshalling wagons on the quayside lines at Hamburg and on the Altona-Kaltenkirchen-Neumünster line. Among its features of interest are its light weight and low cost—the price is below 2,000 RM—and the adaptability which enables it to travel along the rails, to cross over them, or to traverse rough ground, all without demanding any physical exertion on the part of the operator.



Left: The motor being used to propel a vehicle. Right: Being transferred from one track to another transversely—in fact, being wheeled over a crossing at right angles to the track like a wheel-barrow

There are several novel points in the construction of the machine. An integral three-speed gear of epicyclic type is incorporated in the driving wheel, and controlled by a hand-wheel on the guiding arms. A reverse gear is not incorporated in the present model. The Ilo derives its almost tank-like versatility in the matter of traversing obstacles from the heavy and specially shaped rubber tyre with which the driving wheel is fitted. The driving wheel casing carries the 6 h.p. 2-stroke air-cooled motor and the shunting head, the latter being adjustable to suit the height of various classes of vehicles on the principle of motor-car jack. The guiding arms are mounted on a swivel surrounding the casing, and may be swung through an angle of 90 deg. when it is desired to place the machine between a couple of wagons and control it from the six-foot way.

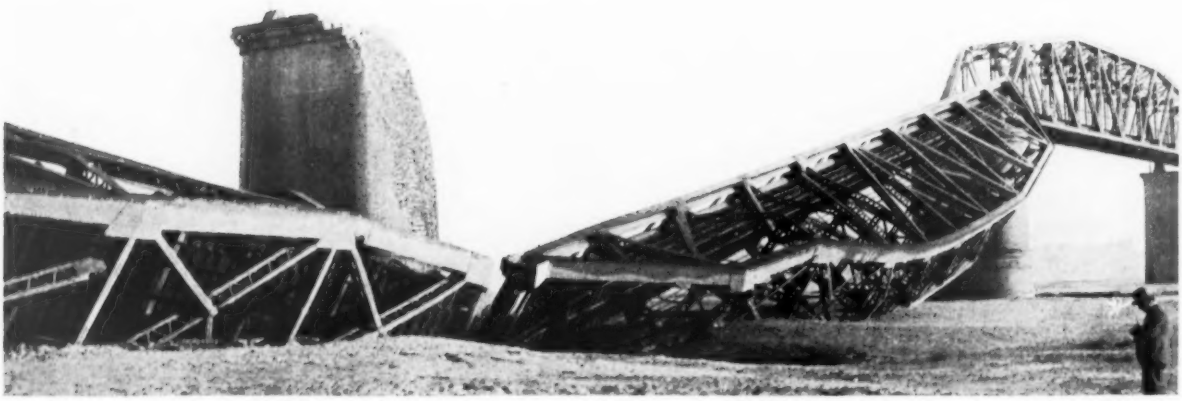
An account of results obtained with the Ilo has been given by Herr Richard, Vice President of the Münster division of the Reichsbahn, in the offiical *Zeitung des Vereins*, from which the foregoing description has been taken. During a four-days' test it showed itself capable of propelling a load of 50 tonnes on dry metals and 30 tonnes when they were covered with snow and ice—a tribute to the design of the driving wheel tyre. The chief drawbacks to the use of the machine at present are its noisy exhaust, rendering it unsuitable for use where shunters have to listen for audible signals, and the fact that it cannot be used on a down grade, as no provision is made to stop a wagon running away from it due to gravity.

L.M.S.R. FREIGHT IMPROVEMENTS AT STOKE-ON-TRENT.—The remodelling and enlargement of Cockshute marshalling sidings, L.M.S.R., is to be completed within the next few days. The alterations have increased the capacity of the main fan of sorting sidings from 394 to 500 wagons, while, by the transfer to the yard of the former L. & N.W.R. of the repair work in connection with private owners' wagons, two additional sidings have been made available, giving an increase in accommodation from 32 to 54 wagons. With the completion of the alterations, a portion of the work hitherto done at Pratt's sidings is being transferred to Cockshute sidings. The sidings are now controlled by one main signal-box, instead of by two as hitherto.

Indian Earthquake Effects on the Bengal & North Western Railway

(including the Tirhut State Railway)

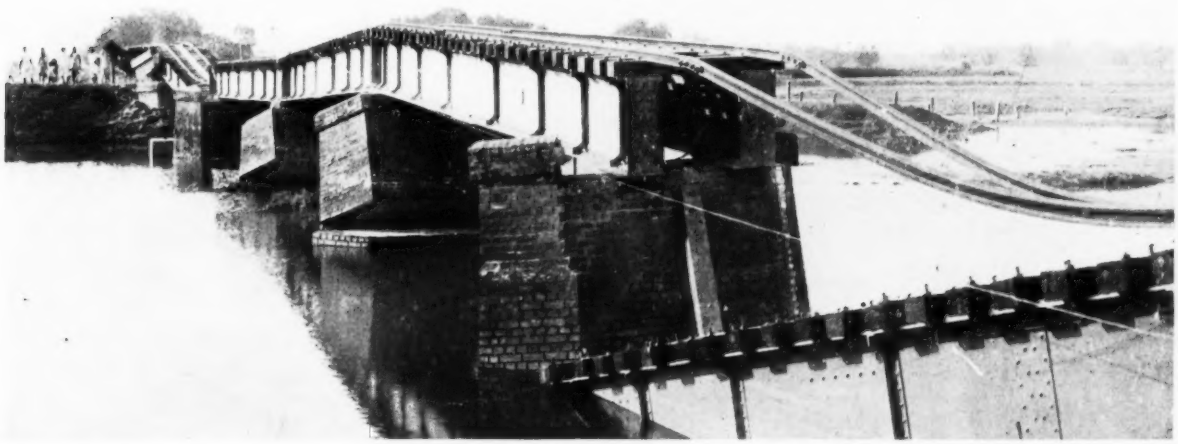
Damage sustained by the Inchcape bridge over the River Gogra



Damaged pier and contorted girders of the Inchcape bridge

Bridge No. 59 in the Darbangha area (two 20 ft. girders), the pier of which has been heaved up to a height of 5 ft. 9 in. above the abutments and formation

Left: Buckling in the Darbangha area. Such lengths of track are always separated from those on each side by broken joints, the rail ends being separated by from 4 ft. to 12 ft. Right: Fissure in the earth beside a new extension



The Lakandai bridge with its piers sheared and tilted longitudinally so that the girders have dropped in places and in others have been pushed up over the abutment

Left: Boor Gandak bridge with sheared pier. Right: Dhanaty bridge near Motihari on the Mazaffarpur-Bettiah section with girders thrown in all directions

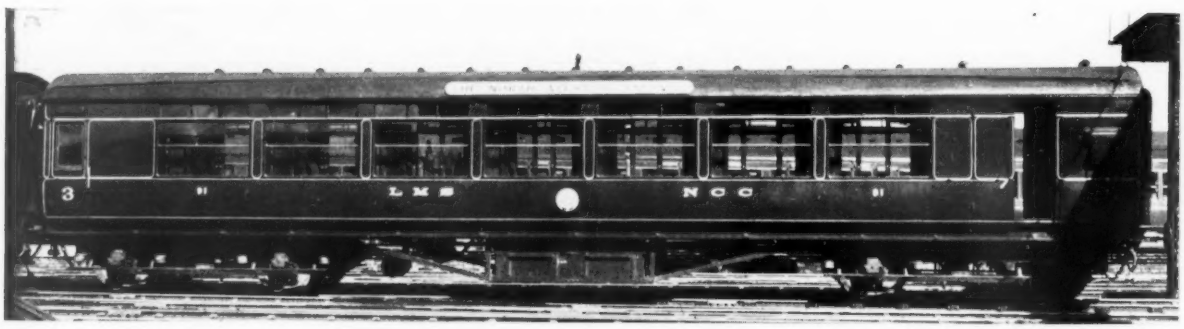
"Cock o' the North"

Photo] *[R. H. Flemming*

Up east coast express, L.N.E.R., hauled by the new 2-8-2 locomotive, No. 2001. Details of an experimental run with this engine are given on page 1147

The North Atlantic Express

(*See page* 1148)



Composite third class and brake coach

Left: The new express of the Northern Counties Committee (L.M.S.R.) in York Road station, Belfast. Right: Interior of buffet car

RAILWAY NEWS SECTION

PERSONAL

We regret to record the death on June 24, of Sir Clarendon Golding Hyde, Deputy Chairman of the late Metropolitan Railway, and partner with the late Lord Cowdray in the firm of S. Pearson & Son Ltd., railway and general contractors. Born in 1858, he was educated at the Royal Institution School, Liverpool, and King's College, London. In 1881 he was called to the Bar, and in 1905 was elected a Director of the Great Northern & City Railway. In the following year he successfully contested the Wednesbury seat in the House of Commons in Liberal interests, and his career was notable for the services he rendered for very many years on a large number of Parliamentary Committees. He was knighted in 1910, and when the Metropolitan Railway acquired the Great Northern & City in 1913, he became a Director of the former company, and was elected Deputy Chairman a year later. This position he held until the absorption of the Metropolitan in the London Passenger Transport Board a year ago. He was a J.P. for Berkshire and High Sheriff of that county in 1918.

INDIAN RAILWAY STAFF CHANGES

Mr. R. C. Moss, Controller of Stores, N.W.R., has been granted 3½ months' leave preparatory to retirement as from February 8.

Mr. R. V. Hitchcock has been appointed to officiate as Deputy Chief Engineer (Maintenance), G.I.P. Railway, as from April 30.

Mr. L. H. Swain has been appointed to officiate as Deputy Chief Controller of Standardisation, Central Standards Office, Railway Board, vice Mr. E. Ingoldby, transferred to the G.I.P. Railway.

Mr. T. C. Hales, V.D., Officiating Divisional Superintendent, N.W.R., has been granted four months' leave as from June 11.

Mr. P. Hackforth has been appointed to officiate as Chief Engineer E.I. Railway as from April 29.

Mr. H. J. Searle, Chief Electrical Engineer, G.I.P. Railway, has been granted seven months' leave, Mr. L. Barber being appointed to officiate instead, as from May 7.

Mr. H. D. Furley, Divisional Superintendent, N.W.R., has been appointed to officiate as Chief Operating Superintendent, as from April 12.

Lieut. Colonel F. A. Cortez Leigh, as announced in THE RAILWAY GAZETTE of April 27, is retiring from the position of Electrical Engineer, London Midland & Scottish Railway, on July 1. His services, however, are being retained at Euston in an advisory capacity, and he will continue to represent the company on various public bodies, and will also be a member of the L.M.S. Advisory Committee of Scientific Research. He received his engineering training at Owen's College, Victoria University, Manchester, and Finsbury College, London, becoming a pupil with the Brush Electric Co. Ltd. in 1890. He was subsequently engaged on power station and arc lighting installations in various parts of the country for this firm. In 1895 he became a partner in Messrs. Lacey, Sillar & Leigh, Consulting Engineers, sometime joint Consulting Engineers to both the Lancashire and the Yorkshire Power Companies with the late Mr. Parshall. After acting for the L. & N.W.R., in a consulting capacity, he was appointed Chief Electrical Engineer to that company in 1909, and was responsible for the Euston-Watford and Broad Street-Richmond electrifications. Previously Captain in the Lancashire Fusiliers T.F., he was transferred, at the request of the War Office, in 1912, to the R.E. Signal Services, T.F., as Lieut. Colonel, and was in charge of the Haynes Park training depôt throughout the latter part of the war. After the amalgamation of the companies now forming the L.M.S.R., he remained as Electrical Engineer, and in this capacity was responsible for the welding together of their various electrical activities. In 1927 he was appointed by the Minister of Transport to the committee to consider standardisation and requirements of electric traction in Great Britain. In 1930, in conjunction with Mr. Gresley of the L.N.E.R., he was responsible for the electrification of the Manchester, South Junction and Altrincham, L.M.S. and L.N.E. joint line, on the 1,500 v., d.c. overhead system — the first scheme completed under the recommendation of the Ministry of Transport's committee—and the Barking-Upminster electrification was also carried out under his supervision. Colonel Cortez Leigh is a Director of the North Wales Power Company and of the Electricity Distribution Company of North Wales, and is the railway representative on the Council of the British Electrical and Allied Industries Research Association and on the North Wales and South Cheshire Joint Electricity Authority, of which he is Vice-Chairman, and also the London and Home Counties Joint Electricity Authority, of which he is Chairman of the Technical and Development Committee. He is a Member of the Advisory Committee of Scientific Research, L.M.S.R., and recently visited America, Germany and Italy on behalf of the company to investigate railway electrification and diesel engine developments in those countries. He also attended meetings of the Traction Section of the International Electrotechnical Committee in various European countries. He is a member of the Institutions of Civil, Mechanical and Electrical Engineers, having been a member of the Council and honorary treasurer of the latter, and is also a member of the Institute of Transport.

Lt. Col. F. A. Cortez Leigh, M.Inst.C.E., M.I.Mech.E., M.I.E.E., M.Inst.T.,

Electrical Engineer, L.M.S.R., 1923–34

Mr. A. E. Sewell, who, as announced in THE RAILWAY GAZETTE of June 8, has been appointed Goods Manager, Southern

Scottish Area, Glasgow, L.N.E.R., in succession to Mr. Mills, was born at Whitby and educated at Ackworth School and at Bootham School, York. He joined the North Eastern Railway Company towards the end of 1903, and gained experience in various stations and departments, including the Passenger Manager's office, where for a time he was in charge of the parcels section.

Mr. A. E. Sewell,

Appointed Goods Manager, Southern Scottish Area, Glasgow, L.N.E.R.

Later he was promoted to the Chief Goods Manager's Rates Office at York, of which he ultimately took charge. From July, 1921, to April, 1922, he was released to act as Secretary to the Committee of Goods and Mineral Managers of the "Eastern Group Companies," which was appointed to co-ordinate the arrangements of the seven component companies in anticipation of amalgamation. In 1923 Mr. Sewell was appointed Rates Assistant to the Goods Manager, North Eastern Area, L.N.E.R., and in 1928 was promoted to be Assistant Goods Manager, Southern Area, the position he now vacates to take up the duties of Goods Manager, Southern Scottish Area.

Mr. D. H. Elias, General Manager, Federated Malay States Railways, arrived in England on leave on May 11.

Viscount Churchill, late Chairman of the Great Western Railway, left estate in Great Britain valued at £75,780.

Mr. Ronald Leslie, General Manager, Central Argentine Railway, returned to Buenos Aires from his European tour on May 12.

At H.M. the King's Investitures on June 26 and 27, Mr. Follett Holt received the Honour of K.B.E., and Mr. Brayshay, Mr. Ronald Matthews and Brig.-Gen. Rhodes that of Knighthood.

Mr. E. G. Horton, who, as announced in THE RAILWAY GAZETTE of June 15, has been appointed District Engineer, Northampton, L.M.S.R., was educated at St. Alban's School and University College, Nottingham, taking his B.Sc. degree at London University. He entered the service of the Midland Railway as a pupil to Mr. W. B. Worthington, Chief Engineer, in 1911, and thereafter gained experience in Parliamentary work, steelwork design, the mining office, and in the testing and inspection of materials. In 1914 he was appointed Assistant to the late Mr. F. H. Frere, M.Inst.C.E., Western Divisional Engineer, being engaged in the general maintenance work of the division, including new sidings at Washwood Heath, Birmingham, King's Norton widening, Redditch goods yard remodelling and permanent way realignments. Mr. Horton saw service in France with the 1st Battalion of the Artists Rifles and was invalided out of the Army in 1916. In 1924 he was temporarily transferred to the New Works Section, L.M.S.R., for Parliamentary work in connection with the Mid Notts joint lines and again in 1928 for constructional work. In the following year he was appointed Assistant to Col. Hull, M.Inst.C.E., District Engineer, Northampton, the position he has held until his recent appointment to take charge of the district.

Mr. E. G. Horton, A.M.Inst.C.E.,

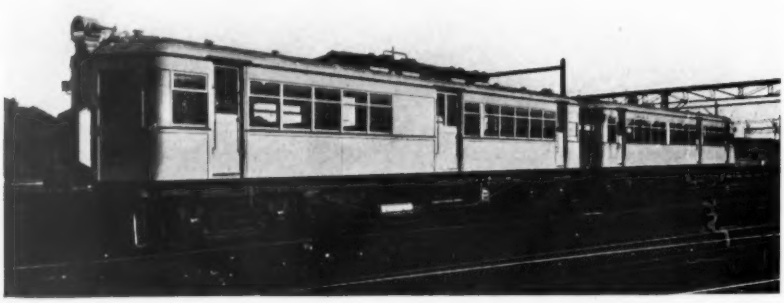
Appointed District Engineer, Northampton, L.M.S.R.

Mr. Horton is an Associate Member of the Institution of Civil Engineers.

Mr. J. N. Peck, who, as announced in THE RAILWAY GAZETTE of June 15, has been appointed District Engineer, London, L.M.S.R., was in March last only, appointed to take charge of the Blackburn District. In that connection his portrait and biography were published in our issue of May 16.

Australian Express Railcars

The first of a series of 260 h.p. petrol-engined railcars now under construction at the works of the New South Wales Government Railways has just completed its trials. When drawing a trailer, the 26¾-ton railcar attained a speed of 65 m.p.h. on the level, and a 15-mile grade of 1 in 60 was climbed at an average of 40 m.p.h. in direct drive. On a subsequent test over a distance of 160 miles, the car climbed a grade of 1 in 30 at 15-18 m.p.h. with only one of the two engines working, and running downhill attained a maximum speed of 75 m.p.h. These railcars are fitted with two Leyland engines and hydraulic torque converters of the types which have been running on the Northern Counties Committee (L.M.S.R.) for the last 18 months, but several modifications have been incorporated to meet local conditions. For instance, the air intake to the carburettor, in order to prevent the entry of sand or dust, is taken from the roof down through the floor of the guard's compartment to a washable filter.



Leyland petrol-engined railcar in New South Wales

The World Crisis and the Railways

The report on the second of the inquiries into questions of immediate interest instituted by the International Railway Congress Association deals with the world crisis and the railways, and has been prepared by Mr. Ashton Davies, O.B.E., Chief Commercial Manager, L.M.S.R. Only those railways which are members of the Association but which are not affiliated with the International Railway Union were approached, namely those of the United States, Canada, Argentina, Brazil, Uruguay, Ireland, British Africa, Egypt, Ceylon, Federated Malay States, India, New Zealand, Chili, Iraq, and the Belgian, Dutch, French and Portuguese Colonies, sixty-three in all. The report appears in the June issue of the *Monthly Bulletin of the International Railway Congress Association*.

Surveyed broadly, Mr. Ashton Davies' report is a monument to the energy with which the railways have confronted the double misfortune of world depression and road competition, but the author points out that although a vigorous stand against adversity may delay the full force of its effects, it does not eradicate the evil itself. If and when a world recovery sets in, however, the railway companies will reap the full benefit of the economies in working and administration which present conditions have forced them to effect.

As to the means at the railways' disposal for the development of passenger traffic, the generally adopted use of "light unit vehicles" appears to have given disappointing results owing to the lack of flexibility inherent in such units for coping with the widely fluctuating traffic demands of a single day on the services for which they are suitable. Mr. Ashton Davies, however, considers that there are great possibilities in the use of light railcars with improved acceleration and braking power for intensive short-distance services, the problem of meeting the requirements of peak periods being met by a modification of operating rules to allow the vehicles to follow each other at the shortest practicable intervals.

The policy of fare reduction has generally increased the number of passengers carried, though hardly enough to compensate for the fall in receipts per passenger and the higher operating costs consequent upon the increase in passenger miles. Sufficient time had not yet elapsed, however, for a just estimate of the effects of such measures to be formed. In most cases, a reduction in the standard fares have not resulted, although this drastic step has had to be taken on the western railways of the United States in consequence of the exceptional decline in passenger traffic.

All the railways reviewed in the report have effected substantial economies in working. The closing of stations and branches has been supplemented by placing stationmasters in charge of the stations at two or more points. Line capacity has been increased by automatic signalling. The most noteworthy developments in locomotive design with a view to securing increased efficiency and lower cost have been those in connection with diesel traction. Otherwise, economy has been achieved largely by the standardisation of parts and the improved user of locomotives.

Prefacing detailed reports dealing with the seventeen countries from which information was received in time for inclusion, Mr. Ashton Davies acknowledges the assistance of the Railway Research Service Bureau, London. The railways of the United States are treated in the greatest detail because America presents practically all the conditions of traffic found elsewhere.

The problems facing the railways of other countries mentioned in the report and the steps taken towards their solution approximate generally to those already described. The relative situations in the countries concerned can be deduced from the table below.

Receipts on Class I U.S.A. railways fell from $6,279 million in 1929, the peak year, to $3,127 million in 1932, a decline of 50 per cent. in three years. The several factors contributing to this situation are given as follows:—

1. World depression in trade.
2. Road competition.
3. Air competition.
4. Hydro-electric and similar power developments tending to restrict the user and haulage of coal.
5. The expansion of the pipe-line industry resulting in the greater use of pipe-lines for the transport of petrol and oil.

With regard to road competition for passenger traffic, the private car has played worse havoc with receipts than the omnibus and has been held responsible for 75 per cent. of the reduction therein. Air competition is particularly keen in the United States on account of the speed at which aircraft accomplish the very long journeys involved between many of the important centres. In 1932, over 20 air companies were operating approximately 120 services, more than 100 of which were passenger carrying routes. Until the recent cancellation of air mail contracts by President Roosevelt, the conditions of this competition were aggravated by the fact that the majority of the air companies were kept going by the substantial subsidies they received for the carriage of mails. In 1932 they received £6,000,000 for this purpose, while the revenue taken by the Post Office amounted to barely £1,500,000. An indication of the demand for high speed transport is furnished by the fact that in 1932 the air companies are said to have carried 540,681 passengers, 715 tons of freight and 3,531 tons of mails. This stimulated the railways to meet the situation by extensive accelerations and the inauguration of rail-air services in collaboration with the air routes.

Falling traffics caused the railways to petition in 1931 for permission to raise freights by 15 per cent. This was not granted, though small temporary increases on certain classes of goods were allowed on condition that the revenue increases so obtained were paid into the Railroad Credit Corporation, a specially formed company which was started in January, 1932. This corporation was soon unable to meet the demands for assistance made upon it, and a more effective relief measure was found in the Reconstruction Finance Corporation, formed at the same time.

In June, 1933, the continued fall in receipts led to the Emergency Railroad Transportation Act, which appointed a Federal Co-ordinator of Transportation to "foster and protect interstate commerce in relation to railroad transportation by preventing and relieving obstructions and burdens thereon, resulting from the present acute economic emergency, and in order to safeguard and maintain an adequate national system of transportation."

Although an emergency measure,

Railway	Gross Receipts		Working Expenses	
	1929	1933	1929	1933
Canadian National	$298,000,000	$161,000,000†	$255,000,000	$155,000,000†
Canadian Pacific	$223,000,000	$124,000,000†	$178,000,000	$104,000,000†
Buenos Ayres Great Southern ...	£13,066,788	£10,560,668	£8,754,445	£7,417,265
Buenos Ayres & Pacific	£9,134,333	£5,827,691	£6,436,223	£4,835,125
Buenos Ayres Western	£5,275,311	£3,546,426	£3,457,808	£2,893,941
Central Argentine	£14,251,698	£9,749,195	£9,817,897	£7,849,021
Entre Rios	£1,543,172	£822,539	£986,503	£741,976
G.W. of Brazil	£976,424	£576,820†	£715,984	£482,041†
Central Uruguay of Montevideo ...	£1,561,058	£785,469	£1,123,626	£576,168
Great Northern (Ireland)	£1,662,689	£1,003,534	£1,387,297	£1,075,469
Great Southern	£4,139,458	£3,000,216	£3,322,097	£2,678,344
South African Railways & Harbours	£26,090,712	£20,619,878	£20,298,664	£15,591,054
Kenya & Uganda Railways & Harbours	£2,448,960	£1,838,661†	£1,445,070	£1,044,161
Nigerian Railway	£2,692,661*	£1,870,436	£1,665,716*	£1,086,136
Egyptian State Railways	£E7,163,000	£E.4,743,000	£E.4,192,000	£E.3,274,000
Ceylon Government Railway ...	R. 32,498,947	R. 22,024,355†	R.25,996,899	R.21,688,864†
Federated Malay States Railways ...	$20,886,597	$7,937,473†	$19,159,646	$8,944,763†
New Zealand Government Railways	£7,524,864	£5,339,075	£6,374,579	£4,833,754

* = 1930 † = 1932

certain of the provisions of the Act were permanent, among them the abolition of the basic principle of the "fair return," placed at 5¾ per cent., in fixing rates. From 1929 to 1932, however, the returns of the Class I railways fell short of this mark, dwindling from 4·84 per cent. to 1·55 per cent. When this system was abolished, all moneys paid over to the government in connection therewith were returned. Thenceforth, rates were governed by the considerations of their effect on the movements of traffic, the provision of as cheap and efficient a service to the public as possible and the requirements of the companies in providing such service.

The responsibility of seeing that the emergency provisions of the Act are complied with rests with the Co-ordinator, assisted by three regional Co-ordinating Committees. His powers are extensive and he is permitted to override existing legislation, though appeals may be made against his orders to the Interstate Commerce Commission. Failure to comply with his instructions involves a fine. Among the stipulations of the Emergency Act is one forbidding the railways to reduce their staff below the level of May, 1933.

The rationalisation envisaged will actually result in the reduction of rail facilities, for it aims at the elimination of competitive passenger services, of circuitous routing of freight trains, and the further creation of joint terminals.

As to road transport, the bus code of November, 1933, restricts the hours of work of employees and fixes a minimum wage. The "trucking" code provides for a 48-hour week for road freight transport employees, a sliding scale of minimum wage, the registration and supervision of operators and the fixing of rates between groups of hauliers, providing they are in relation to existing approved road and rail rates.

Among the measures taken by the railways themselves to meet the present situation, mention must be made of their efforts to co-ordinate rail and road services both in co-operation with road hauliers and by providing road transport of their own. The general policy being pursued is to substitute road services for branch railway routes and to use the same agency in linking up main lines with districts with which they were hitherto out of touch. For freight traffic, combined rail and road transport is being used to provide door to door service. Operating economy has been rigorously pursued between 1929 and 1933, a reduction of 50 per cent. in gross operating expenses being effected. At the same time, gross operating revenue fell by 50·6 per cent. Other special measures, such as the adoption of light units for passenger services, accelerations and the use of smaller wagons have been detailed in THE RAILWAY GAZETTE as introduced.

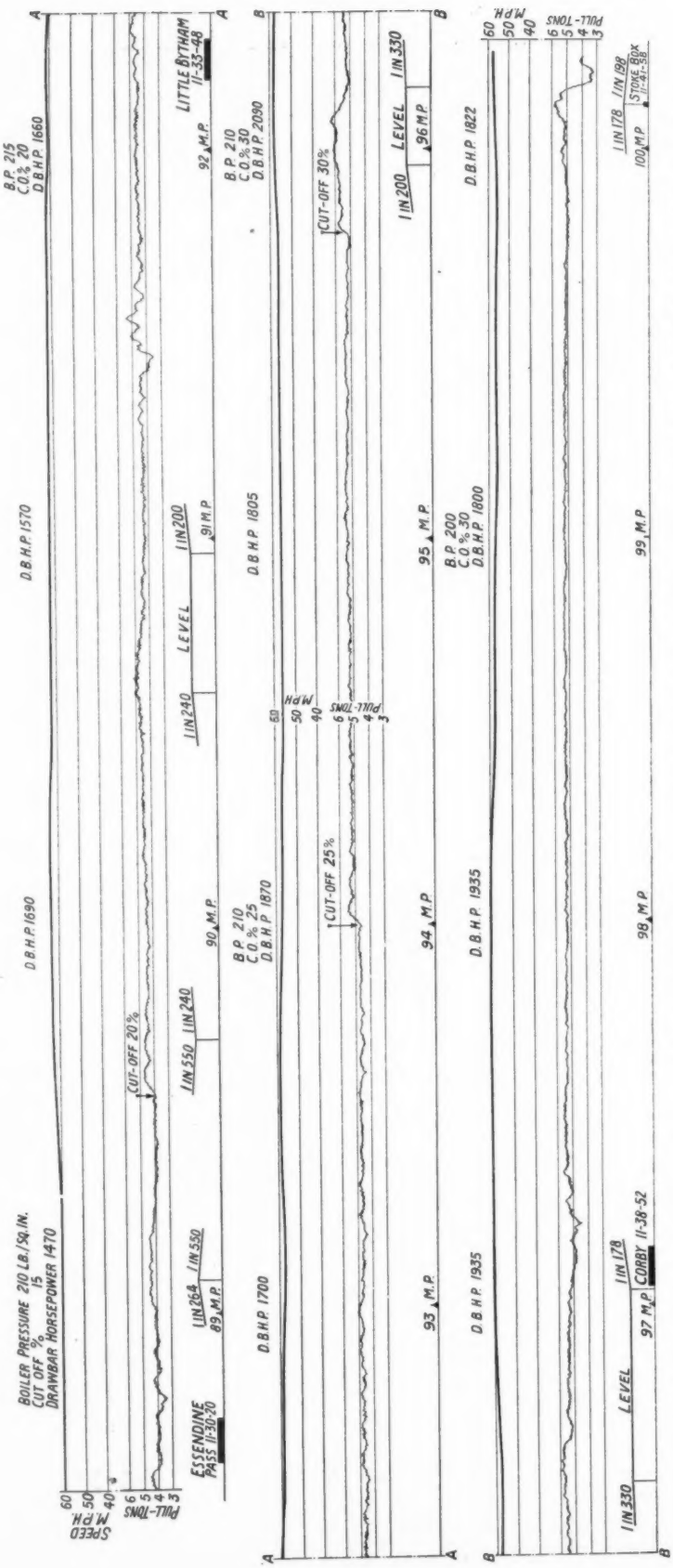


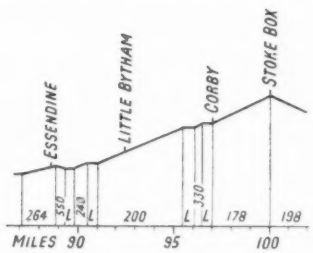
Diagram showing speed, drawbar pull, cut-off, and drawbar horse power of the test run of 2-8-2 locomotive No. 2001, L.N.E.R. (see article opposite)

Experimental Run with the "Cock o' the North," L.N.E.R.

On Tuesday, June 19, a successful trial run was made with the new London & North Eastern Railway 2-8-2 express locomotive No. 2001, *Cock o' the North*. A 19-coach train, including the dynamometer car, was made up, weighing empty 649 tons, and left King's Cross at 9.50 a.m. After a 2½ min. stop at Peterborough, the load was worked on through Grantham to Barkston, where it was taken on to the Lincoln line, clear of the main line. After the engine and train had there been turned, they returned to London, calling again at Peterborough. No attempt was made to attain high downhill speeds, and some of the 1 in 200 falling gradients were descended without steam, a remarkable feature, however, being the free running when coasting.

But the performance of the new engine uphill certainly beat every record hitherto made over the L.N.E.R. main line. The engine started the heavy train from King's Cross easily, and the initial drawbar pull was 14 tons. The cut-off was reduced to 45 per cent. 750 yd. from the start, the speed then being 20 m.p.h. on the gradient of 1 in 105-110 which extends from the platform end at King's Cross for 1¼ miles through the two tunnels to Holloway. At the second milepost speed was 32½ m.p.h., and on the subsequent level and 1 in 445 up to Finsbury Park, it rose to all but 40 m.p.h., and up the ensuing 1 in 445 to Harringay to 46 m.p.h., while the brief drop at 1 in 285 past Hornsey produced a maximum of 58½ m.p.h., the drawbar pull here being 5 tons equivalent to 1,730 drawbar horsepower. The succeeding 7·7 miles, continuously ascending at 1 in 200 from mile 4½ (Wood Green) to Potters Bar, were then covered in 8 min. 38 sec., without the speed falling below 50 m.p.h. at any point, so making possible the most unusual exit time of 22 min. 31 sec. from King's Cross to Hatfield, 17·7 miles. The cut-off was increased from 20 per cent. to no more than 22 per cent. about half way up this ascent, and the boiler pressure never fell below 195 lb. per sq. in. Subsequent times were 29 min. 51 sec. to the summit at Knebworth, 25·0 miles; 36 min. 4 sec. to Hitchin, 31·9 miles; 47 min. 24 sec. to Sandy, 44·1 miles; 60 min. 44 sec. to Huntingdon, 58·9 miles; and 70 min. 46 sec. to Holme, 69·4 miles, no special demand being made upon the locomotive over this section. Speeds were in the neighbourhood of 70 m.p.h., with 1,300 d.b.h.p. on the fall to Hitchin, and thence to Huntingdon, the speed was maintained on the level with a cut-off reduced to 10 per cent. yet with a d.b.h.p. of 1,050 and a pull of 2½ tons. After Huntingdon the cut-off was increased to 15 per cent. to negotiate the three-mile gradient of 1 in 200 to Leys box where speed had fallen to 53 m.p.h., the pull here being 4·2 tons and the d.b.h.p. 1,330. The cut-off was then brought back to 10 per cent. and would have remained so until Peterborough, had not two bad permanent way checks necessitated its increase to 30 per cent. to effect recovery of speed again from them. Nevertheless, Peterborough, 76·4 miles, was reached in 81 min. 46 sec., or about 79 min. net.

Restarting from Peterborough a pull of 16½ tons was recorded, falling to 12 tons at 10 m.p.h. The engine was progressively notched up, the 20 per cent. position being reached when the speed was 33 m.p.h. On the two-mile gradient of 1 in 264 near Essendine the speed did not fall below 60 m.p.h. A pull of 4·1 tons was given at this speed, equivalent to a d.b.h.p. of 1,470.



PERFORMANCE BETWEEN ESSENDINE AND STOKE BOX
2-8-2 Engine No. 2001. 19 coaches = 649 tons tare

Location	Gradient Up	Speed, M.p.h.	Drawbar Pull, Tons	Drawbar Horse-power
Essendine (88·6 miles)	1 in 264§	60	4·10	1,470
90 mile post..	See note ¶	63	4·50	1,690
,, ,, ..	1 in 200*	62	4·25	1,570
92 ,, ,, ..	1 in 200*	60½	4·60	1,660
93 ,, ,, ..	1 in 200*	58	4·90	1,700
94 ,, ,, ..	1 in 200*	58	5·40	1,870
95 ,, ,, ..	1 in 200*	56	5·40	1,805
96 ,, ,, ..	Level†	57½	6·10	2,090
97 ,, ,, ..	Level†	60	5·40	1,935
98 ,, ,, ..	1 in 178‡	60	5·40	1,935
99 ,, ,, ..	1 in 178‡	57	5·30	1,800
Stoke Summit (100·1 miles)	1 in 178‡	56½	5·70	1,920

* 91-95¼ miles = 4¼ miles long.
† 95¼-97 miles = 1¾ miles long in two stretches with an intermediate half-mile rise of 1 in 330.
‡ 97-100 miles = 3miles long.
§ 87¼-89 miles = 1¾ miles long.
¶ 89-91 miles = ½-mile *down* at 1 in 550, ½ mile level, ½ mile up at 1 in 240, and ½-mile level.

The gradient of 1 in 200 from near Little Bytham to near Corby, 4½ miles long, was begun at 63 m.p.h., and for about the first half of this distance the cut-off was 20 per cent., 1,700 d.b.h.p. being obtained at a speed of 58 m.p.h. The cut-off was then increased to 25 per cent., and in this position a pull of 5·4 tons was given at 56 m.p.h., corresponding to 1,800 d.b.h.p. The boiler pressure varied between 210 and 215 lb. Near the top of the bank, at the same speed, the cut-off was increased to 30 per cent., and on the short stretch of level a pull of 6·1 tons was exerted at a speed of 57½ m.p.h., corresponding to an h.p. of 2,100 at the drawbar. After Corby there is a gradient of 1 in 178 for three miles, and the speed at the foot of this was 60½ m.p.h. The engine climbed this bank in 30 per cent. cut-off, the speed remaining constant at 60 m.p.h. for a mile, then falling to 57 m.p.h. at the end of the second mile, and to 56½ at the summit of the final mile, giving the astonishing time, with this load, of 11 min. 38 sec. for the 11·5 miles from Essendine to Stoke summit, which is practically a mile-a-minute average for the whole distance. For 7 miles continuously the drawbar pull exceeded 5 tons, and the d.b.h.p. was over 1,800. The pull remained very steady, being 5·4 tons at mile post 98 at a speed of 60 m.p.h., corresponding to 1,930 d.b.h.p. The dynamometer car record on this section is reproduced, as well as a table detailing the figures. A stop could have been effected at Grantham in 32½ min. from Peterborough, whereas the fastest ordinary start-to-stop booking in this direction, in consideration of the grade, is 36 min. The actual times from Peterborough were 15 min. 5 sec. to Essendine, 12·2 miles; 23 min. 37 sec. to Corby, 20·7 miles; 26 min. 43 sec. to Stoke, 23·7 miles; 31 min. 57 sec. to passing Grantham, 29·1 miles; and 38 min. 15 sec. to Barkston, 33·3 miles.

The engine and train were turned on the triangle at Barkston, which is on a gradient of 1 in 200, the starting pull required being 14½ tons. The engine was put into 40 per cent. cut-off half a mile from the start, and at the end of the first mile the speed was 26 m.p.h., the pull was 8·35 tons, and the d.b.h.p. 1,295. Cut-off was reduced to 15 per cent. about two miles from the start and kept there till about ¾ mile past Grantham, being then increased to 20 per cent. in readiness for the succeeding five-mile gradient of 1 in 198. The d.b.h.p. on this incline varied from 1,415 to 1,490. The speed at the foot of this was 49 m.p.h., falling to 45 m.p.h. at the top, with a boiler pressure of 210 lb. The succeeding ten miles are all on falling gradients, mainly 1 in 178 and 1 in 200. Steam was shut off on these, and the engine put into mid-gear, in which position the poppet exhaust valves are held off their seats, resulting in an extraordinarily free running engine. The speed at the top of the gradient was 60 m.p.h., and there was little variation in this speed when coasting. Owing to the nature of the line, very little effort was required for the remainder of the distance to Peterborough. The starting pull at Peterborough rose to 16·3 tons. About two miles from the start the engine was put into 12 per cent. cut-off, which was increased to 15 per cent. after a further two miles. It was kept at this, except for about three miles at Abbots Ripton, where it was increased to 20 per cent. The minimum speed up these 4½ miles

of 1 in 200 was 45½ m.p.h. No very large horse powers were recorded before reaching Huntingdon; after speed had been attained they varied between 1,270 and 1,515. Approaching Huntingdon the cut-off was reduced to 12 per cent. and left at that for about 20 miles, when it was increased to 18 per cent. near Biggleswade. On the gradient of 1 in 330 shortly after passing that station, the d.b.h.p. was 1,667 at a speed of 62½ m.p.h. On the gradient of 1 in 200 before Hitchin the cut-off was increased to 25 per cent. and a pull of 4·9 tons obtained at 61½ m.p.h., equivalent to 1,800 d.b.h.p. at the drawbar. The 21·9 miles Huntingdon to Arlesey were run in 20 min. 14 sec. The mile at 1 in 264 followed by five miles at 1 in 200 through Hitchin to Stevenage were climbed in fine style with a minimum speed of 56 m.p.h. The 1 in 200 after Hitchin was climbed in 30 per cent. cut-off, the best horse power recorded at the drawbar being 2,100 at a speed of 60 m.p.h., the drawbar pull being 5·9 tons. After this gradient was surmounted, very little further effort was required to Hatfield, but a permanent way caution near Knebworth required steam to be shut off, the speed being reduced to 34 m.p.h., requiring the engine to be worked for a short way in 40 per cent. and 30 per cent. cut-off, reduced to 12 per cent. after about two miles. The cut-off was increased to 20 per cent. for a short distance after passing Hatfield, and 1,690 d.b.h.p. registered. The final five-mile climb from Hatfield to Potters Bar (mostly at 1 in 200, 390, 330, 550 and 200) gave speeds of 65½ m.p.h. at Brookman's Park and a minimum of 63 m.p.h. on the last length of 1 in 200 to the summit. On the descent into London steam was shut off about three miles beyond Potters Bar summit and a very cautious approach was made to King's Cross owing to the great length and weight of the train. But Hitchin was passed in 47 min. 7 sec. from Peterborough (44·5 miles); Knebworth in 55 min. 10 sec. (51·4 miles); Hatfield in 62 min. 25 sec. (58·7 miles); Potters Bar in 67 min. 3 sec. (63·7 miles); and Finsbury Park, after a maximum speed of 76 m.p.h. at New Barnet, in 75 min. 47 sec. (73·9 miles). The total time from Peterborough to King's Cross with this very heavy train was 81 min. 25 sec., in spite of comparatively easy running over long stretches, coasting down to King's Cross, and the permanent way check near Knebworth. Editorial comment on this remarkable performance appears on page 1127. An illustration of the *Cock o' the North* on regular east coast service is reproduced on page 1142

The North Atlantic Express

A new train, built by the Northern Counties Committee of the L.M.S.R. for its Portrush-Belfast business service

(*See illustrations on page* 1142)

The North Atlantic Express came into service on June 1, as we recorded last week, for the convenience of Portrush residents whose business interests are in Belfast. Leaving Portrush at 8.10 a.m., the train arrives in Belfast at 9.30 a.m. The corresponding evening return train leaves Belfast at 5.15 p.m., arriving in Portrush at 6.35 p.m. On Saturdays the North Atlantic Express returns at 12.40 p.m. from Belfast to Portrush. The 65¼ miles, via the new Greenisland avoiding line, which was described in THE RAILWAY GAZETTE of June 16, 1933, are thus covered at an average speed of 49 m.p.h.

The North Atlantic Express consists of three corridor coaches: one 60-ft. buffet car, one 57 ft. brake third, and one first, second, and third composite coach, giving a total seating capacity of 110. The body framing in each case is of teak with mahogany panelling outside and inside. The exterior of the train has been designed to give an almost flush finish, and with the large 5 ft. windows, presents a very attractive appearance. Above the window in each compartment, and also in the corridors, a sliding extractor ventilator is fitted.

The buffet car is finished internally in mahogany, with light blue Rexine panels, and the floor is covered with blue Ruboleum. The furniture throughout this coach is of the chromium-plated tubular pattern with blue upholstery. The tables have blue glass tops. Gold-coloured curtains are fitted to the large side windows, and bell pushes and frameless bevelled glass mirrors are placed opposite each table. There is a blue glass topped mahogany bar at one end of the coach, and behind it the kitchen which is capable of turning out anything from a light snack to a full course dinner. The kitchen is sheeted with Staybrite steel, and hot and cold water is laid on throughout. It is equipped with a gas range and refrigerator. There is a wardrobe for the clothes of the kitchen staff. This coach is fitted with Hoffmann roller-bearing axleboxes to ensure smooth running.

The first class compartments are finished in mahogany with pink Rexine panels to match the pink upholstery. The floor has a covering of pink Ruboleum, surmounted by a handsome carpet. A frameless bevelled mirror is fitted on each side between two framed etchings. Chromium bracket reading lamps are fitted above each seat and Bakelite ashtrays and bell-pushes are provided. The metalwork is chromium-plated throughout. On the seats are loose cushions, supported by spring frames. Head rests and folding arm-rests are provided.

The second and third class compartments are finished in mahogany with light blue Rexine panels and light blue upholstery. Adjustable arm-rests are provided so as to seat three a side. The floor is covered with blue Ruboleum, and in the second class, carpets are provided. On the walls are framed photographs and on each side, above the seat, is a frameless bevelled mirror. Chromium-plated bracket reading lamps are provided over each seat as well as the single roof light in each compartment. Bell-pushes and ashtrays are provided here as in the first class compartments.

Access to each compartment from the corridor is by double sliding doors, so arranged in conjunction with the corridor partition as to give passengers on the corridor side a window outlook equal to that on the body side. Standard gangways are fitted between the coaches, and hot and cold water is provided in all lavatories.

The underframes for the two coaches are of standard design mounted on 9 ft. bogies. The buffet car underframe is of similar construction, but is 3 ft. longer. They are constructed of rolled sections, the solebars, bolsters, longitudinals and head stocks being channels, the truss frames of angle sections. The bogies are of the four-wheeled single bolster type, with helical concentric bolster and side laminated bearing springs. Electric lighting is provided by the L.M.S. Wolverton single-battery system, one dynamo being slung under each coach, and driven by a belt from one of the axles.

RESEARCH ON HIGH VOLTAGE TRANSMISSION.—In the past three years comprehensive equipment has been assembled at the Wood Lane research laboratories of Callender's Cable & Construction Co. Ltd., for the investigation of problems related to the distribution of electrical power. In particular, provision has been made for the testing of extra high voltage cables and porcelain insulators. The laboratories were opened on June 22, by Lord Rutherford who stressed the necessity for liaison between research and practical work outside, and for making broad contacts with other laboratories and manufacturers. The problem of substituting d.c. for a.c. is something to be dealt with in the future. A tour was made of the laboratories which include dielectric and physics departments. In the high voltage laboratory where there are two 500 kV, 500 kVA Ferranti transformers, there was an interesting high voltage demonstration by allowing a discharge to earth over a 5-ft. gap. The guests freely expressed their appreciation of the enterprise shown by the directors of the company in tackling the problems confronting engineers in the field of high voltage transmission.

High Speed Running

(*See editorial article on page* 1129)

Two remarkable runs were made by ordinary trains on the Great Western and London & North Eastern Railways on May 15 and 16 last respectively, and the interest of these achievements in relation to each other is that they took place over stretches of line closely corresponding in gradient and alignment. The times and speeds shown in the annexed tables were recorded by Mr. Cecil J. Allen, M.Inst.T. The G.W.R. run was made on the Cheltenham Flyer express, and was noteworthy by reason of the speed maintained with

G.W.R. SWINDON—PADDINGTON

Engine: No. 5005, *Manorbier Castle*.
Driver Lewis (Old Oak Shed).
Load: 8 = 249 tons tare, 265 tons gross.

Distance		Schedule	Actual	Speed
miles		min.	min.sec.	m.p.h.
0·0	SWINDON	0	0 00	—
5·7	Shrivenham	—	6 55	75
10·8	Uffington	—	10 43	82½
13·4	Challow	—	12 40	84
16·9	Wantage Road ..	—	15 05	85½
20·8	Steventon	18½	17 48	86½
24·2	DIDCOT	21	20 11	86½
28·8	Cholsey	—	23 31	83½
32·6	Goring	—	26 14	79½
35·8	Pangbourne	—	28 32	80½
38·7	Tilehurst	—	30 46	81½
41·3	READING	34	32 41	81½
46·3	Twyford	—	36 22	83½
53·1	Maidenhead	—	41 13	84
58·8	SLOUGH	47	45 22	84
64·1	West Drayton ..	—	49 11	81
68·2	SOUTHALL	54½	52 25	eased
71·6	Ealing	—	55 42	—
76·0	Westbourne Park ..	61	60 26	—
77·3	PADDINGTON ..	65	63 22	—

an unusual load of eight coaches, weighing with passengers and luggage 265 tons. The engine, as usual, was of the 4-cylinder 4-6-0 Castle class, driven by Lewis, of Old Oak shed. In less than six miles from the Swindon start, down a gradient of 1 in 834, the train was travelling at 75 m.p.h.; down the very gradual fall from Shrivenham to Didcot, mostly at 1 in 754, the rate first passed the 80 m.p.h. line 9 miles after starting, and then gradually increased to a sustained 86½ m.p.h. between Steventon and Didcot. On turning into the Thames Valley at Didcot, a following wind became slightly more perceptible as a side-wind, and speed dropped on the level to slightly below 80 m.p.h. at Goring, but as the line turned westwards again beyond Pangbourne speed slowly increased on the level until between Maidenhead and Slough it was up to a steady 84 m.p.h.

Near Hayes, in order to avoid too early an arrival, Lewis partially closed the regulator, and worked on the first port from there until steam was shut off for Paddington; a very cautious approach from Westbourne Park and an unusually slow stop were made. Nevertheless the 77·3 miles from Swindon had been run in 63 min. 22 sec., and there is no question that with a continuance of the previous effort from West Drayton onwards, Paddington would have been reached in not more than 60½ min. From Shrivenham to Hayes, a distance of 60·7 miles, the speed never fell below 80 m.p.h., save for the momentary 79½ m.p.h. at Goring troughs, and this distance was covered in precisely 44 min., at an average speed of 82·8 m.p.h. throughout. It may be mentioned that the train contained 332 passenger seats (or 264 seats if the third-class passengers were seated three-a-side only), together with a 30-seater restaurant car and kitchen, and three brake compartments of ample size for luggage.

On the following day the run detailed in the second table was made over London & North Eastern metals from Darlington to York. The train in this case consisted of ten bogie coaches and a triplet restaurant car set, weighing in all 417 tons tare and 440 tons with passengers and luggage; the engine was Super-Pacific (220 lb. pressure) No. 2597, *Gainsborough*. Speed slightly increased up the 1 in 391 from Croft Spa to Eryholme—from 56 to 57 m.p.h.—rose on the 1 in 650 from Eryholme down to Danby Wiske to 73¾ m.p.h., and fell slightly on the level thence to Northallerton, to a minimum of 72½ m.p.h. On the 1 in 629 from Northallerton down to Thirsk (very slightly easier than the G.W.R. line from Shrivenham to Didcot) speed then mounted up to 83¼ m.p.h., and it is significant that on the dead level between there and Sessay it was maintained steadily at 81¾ m.p.h., notwithstanding a strong side-wind and driving rain. The slight fall at 1 in 740 past Pilmoor produced a further maximum of 83½ m.p.h.

Speed was still rising when the driver, as Lewis had done, partly closed his regulator, in order to avoid reaching York too early, with the result that the rate gradually fell away to 70 m.p.h. at Beningbrough. An extremely cautious approach was made round the curves to York, partly as a result of distant signals " on " ahead, but the run of 44·1 miles was completed in 41 min. 8 secs., or 4 min. under schedule time. But for the easing, the run from Darlington to York would

L.N.E.R. DARLINGTON-YORK

Engine: 4-6-2 No. 2597, *Gainsborough*.
Load: 13 = 417 tons tare, 440 tons gross.

Distance		Schedule		Speeds
miles		min.	sec.	m.p.h.
0·0	DARLINGTON	0	00	—
2·6	Croft Spa	4	28	56
5·2	Eryholme	7	13	57
6·9	Cowton	8	55	—
10·4	Danby Wiske	11	51	73¾
14·1	NORTHALLERTON ..	14	56	72½
17·5	Otterington	17	39	79
21·9	THIRSK	20	51	83½
26·1	Sessay	23	55	81¾
28·0	Pilmoor	25	18	83½ eased
30·7	Raskelf	27	23	75
32·9	Alne	29	09	73
34·4	Tollerton	30	23	—
38·6	Beningbrough	33	53	70
42·5	Poppleton Junction ..	37	36	—
44·1	YORK	41	08	—

probably have been completed in 39 min. In this case the 16·6 miles of but little easier than level line from Northallerton to Raskelf were run at an average speed of precisely 80 m.p.h., and the significance of the achievement lies in the fact that this was a 13-coach train, 65 per cent. heavier than the Cheltenham Flyer just previously quoted. The accommodation of the train consisted of 322 third-class and 81 first-class seats, together with 36 first-class and 42 third-class seats in the restaurant cars, some of which were occupied throughout the journey. One of the latest first-class coaches, seating only 24 passengers, was included in the formation, and two arm-rested thirds, seating three-a-side; with no more than three passengers a side in all the third-class compartments, there would have been 300 third and 117 first-class seats in the train, plus a 60 ft. brake-van, two large additional brake compartments, and a kitchen and pantry car. This amounts to roughly four times the accommodation of the Flying Hamburger railcar, and yet it was found possible to work such a train single-headed on the level at a sustained speed of over 80 m.p.h.

BI-METAL CONDUCTORS.—An important addition to the types of conductor for supplying mobile machinery such as conveyor cranes and transporters, depending upon a friction contact for their supply of current, is now being manufactured by Estler Bros. Ltd., South Molton Road, E.16. The conductor is in the form of a light and rigid steel rail with a copper tread. It has been designed to supersede strained wire conductors, with their tendency to sag between the points of suspension, while retaining the advantages of easy erection and light weight. The rail is turned out in standard lengths of 22 ft. 6 in. or 45 ft., and is manufactured in two base widths of 20 mm. or 45 mm. The rail joints are of the clamp type, a nut and bolt passing below the foot of the rail being provided to tighten up the flanges. Either fixed or expansion joints are available, and the expansion type has copper side cheeks which preserve the mechanical continuity of the conductor surface and prevent sparking.

For mounting the rails, a range of Estler-North all-purpose insulators is supplied. These provide for support or suspension, and carry chairs to hold the rail vertically or horizontally. Various types of Estler slipper, roller and wheel collector gear are manufactured for use with the conductor. The rail is supplied in heights of 32 mm., 33 mm. and 34 mm. with the 20 mm. base, and 43 mm., 47 mm., 50 mm., 52 mm. and 58 mm. with the 45 mm. base. In the largest size the weight has been kept down to 4·12 lb. a foot. A convenient feature of the conductor is that it can be installed and made alive in sections to facilitate its own completion and that of other equipment.

RAILWAY AND OTHER MEETINGS

The West of India Portuguese Guaranteed Railway Co. Ltd.

The fifty-third annual general meeting of the proprietors of the West of India Portuguese Guaranteed Railway Co. Ltd. was held at 4, Coleman Street, London, E.C.2, on Wednesday, June 20th, 1934, Mr. Charles P. Whitcombe, M.Inst.C.E., in the chair.

The Chairman: Gentlemen, I will call upon the Secretary to read the Notice convening the Meeting together with the Report of the Auditors on the Balance Sheet and Statement of Accounts.

The Secretary (Mr. Leonard G. Bourchier): "The West of India Portuguese Guaranteed Railway Company Limited. Notice is hereby given that the Fifty-third Annual General Meeting of Members will be held at 4, Coleman Street, on Wednesday, June 20, 1934, at two o'clock p.m., for the following purposes: (1) To receive and adopt a report from the Directors and the audited statement of accounts and balance sheet for the year ended December 31, 1933. (2) To elect a Director. (3) To appoint auditors for the ensuing year and to fix their remuneration. (4) To transact any other ordinary general business of the company required to be dealt with at such meeting. By order of the Board, Leonard G. Bourchier, Secretary. Offices of the West of India Portuguese Guaranteed Railway Company, Limited, 4, Coleman Sereet, E.C.2. June 11, 1934."

"Report of the Auditors to the Members of the West of India Portuguese Guaranteed Railway Company Limited. We have examined the above Balance Sheet with the Books and Vouchers of the Company, kept in London, and we have seen that the printed returns received from India have been incorporated therein. We have obtained all the information and explanations we have required. In our opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Company's affairs according to the best of our information and the explanations given to us, and as shown by the books of the Company. Norris, Tucker & Co., Chartered Accountants, Auditors. London, May 18, 1934."

The Chairman: "Gentlemen, copies of the Fifty-Third Annual Report of the Directors and Statements of Account for the year ended December 31, 1933, were issued to Members on the 11th of this month, and I propose, with your permission, to take them as read. (Agreed.)

Before commenting on matters connected with the operations of the Company during the year 1933, I wish to invite your attention to that part of the Directors' Report which notifies that our Chairman, Mr. E. E. Sawyer, desires to retire from the Board owing to ill health.

It was in the autumn of 1879 that Mr. Sawyer was selected by an influential Committee presided over by the Duke of Sutherland, and officially known as the Stafford House Committee, to proceed to India in order to prospect for a line of railway between British India and the roadstead of Mormugao; also, to investigate the possibility of developing the latter as the terminal seaport of such railway.

In 1881, Mr. Sawyer was appointed Chief Engineer for the construction of the Railway and Harbour; in 1882, Agent and Chief Engineer; in 1888, the work having been completed, he left the W. I. P. Railway Company, but rejoined, as a Director, in 1897; in 1912 he was elected Chairman, and I need scarcely remind you of his eminent services to the Company in that capacity.

Mr. Sawyer's unavoidable absence from recent Board meetings has been very much regretted by his co-directors, and I feel sure you will each and all desire to associate yourselves with us in wishing him a speedy and complete recovery; also, in according him a hearty vote of thanks for and in appreciation of his long and valuable service to the Company. (Hear, hear.)

As usual, the report contains a comparison of the gross revenue, working expenses, net revenue and percentage of working expenses on gross earnings for the year under review and the previous year. It will be observed that there has been an increase in gross earnings to the extent of Rs. 5,57,504 and in working expenses of Rs. 4,71,331, together resulting in an increase in the net earnings of Rs. 86,173. The percentage of working expenses to gross earnings, for the Railway and Harbour combined, has risen from 58·03 to 62·80 per cent.

The actual figures compared with those of last year are as follows:

Railway and Harbour Combined

Year	Gross Revenue Rs.	Working Expenses Rs.	Net Revenue Rs.	Percentage of Working Expenses on Gross Revenue
1932	23,30,995	13,42,762	9,88,233	58·03
1933	28,88,500	18,14,094	10,74,406	62·80

With regard to the working expenses for the year 1933, it should be mentioned that these include a sum of Rs. 71,162 representing excess harbour receipts credited to the Portuguese Government under the terms of the subsidiary contract of 9th February, 1929. In the year 1932 no such credit occurred, inasmuch as the gross harbour receipts fell short of the average above which excess harbour receipts become payable. In the event of the gross harbour receipts exceeding the average, calculated as indicated in the subsidiary contract, the Portuguese Government are credited with such excess up to but not exceeding a sum equal to fifteen per cent. of the net harbour receipts for the year. If this charge, as also the charge of £1,275, representing interest on advances by the Company for capital works, which cannot be properly considered as expenses incurred in the actual working of the railway and harbour, were eliminated, the operating expenses for 1933 would be reduced to a sum equivalent to 59·68 per cent. of the gross receipts instead of 62·80 and the net earnings in sterling, as shown in the report, namely, £71,627, would be increased by £6,019 to £77,646. It will be seen, therefore, that, as regards the actual working of the railway and harbour, the net earnings exceeded the amount of the Portuguese Government guarantee, namely £73,000, by £4,646.

Analysing, separately, the cost of working the railway and harbour, the figures for gross revenue, working expenses, net revenue, and percentage of working expenses on gross revenue, for these two years, compare as follows:

Railway

Year	Gross Revenue Rs.	Working Expenses Rs.	Net Revenue Rs.	Percentage of Working Expenses on Gross Revenue
1932	14,61,441	8,03,829	6,57,612	55·02
1933	18,21,582	11,94,033	6,27,549	65·54
		Harbour		
1932	8,69,554	5,38,934	3,30,620	61·99
1933	10,66,918	6,20,061	4,46,857	58·12

As regards the Railway, it will be noted there has been an increase of Rs. 3,60,141 in gross revenue with an increase of Rs. 3,90,204 under working expenses, together resulting in a decrease in net revenue of Rs. 30,063. The average receipts per mile per week work out to Rs. 687 as compared with Rs. 551 in 1932 and the receipts per train-mile to Rs. 9·16 as against Rs. 8·70.

The recorded tonnage of rail-borne traffic amounted to 461,114 tons, which is 74,147 tons or 19·16 per cent. higher than for the year 1932.

Practically, the whole of the increase in gross earnings was derived from general merchandise, and, chiefly, from the carriage of oil-seeds; the tonnage railed during the year under review amounting to 177,759 tons as compared with 101,212 tons in the previous year. The weight of manganese and chrome-ore railed amounted to 103,411 tons as compared with 107,288 tons.

Coaching traffic at Rs. 1,81,965 increased by Rs. 6,273 or 3·57 per cent. This slight improvement is due, as mentioned in the report before you, chiefly to the additional

train-service between Sanvordem and Mormugao, which has proved popular with the public and which has, during the year under review, been in operation for a full twelve-months as against four months only in 1932.

As regards the working expenses, these, under the working agreement with the Madras & Southern Mahratta Railway, are debited to the combined working expenses of the whole system operated by that Company and, thereafter, distributed in proportion to respective gross earnings. To the share applicable to the W.I.P. Railway is added outlay under new minor works and any other items of expenditure which constitute a separate charge, under the working agreement between the two Companies.

The working expenses of the W.I.P. Railway show an increase of Rs. 3,90,204, the percentage of expenses to earnings being 65·54 as compared with 55·02 in 1932. Explanations specially applying the variations in the expenses of the W.I.P. Railway cannot be given as the working expenses, as stated above, are apportioned on a gross earnings basis, and must, therefore, vary from causes affecting the combined outlay of the system apart from any variation in the actual expenditure on the W.I.P. Railway line. The increase of 10·52 in the percentage of working expenses is due partly to the increased percentage of working expenses of the whole system operated and partly to larger debits on account of sundry direct charges.

Turning to the Harbour, it will be seen that gross receipts increased by Rs. 1,97,364, working expenses by Rs. 81,127 and net revenue by Rs. 1,16,237, with a consequent reduction in the percentage of working expenses to gross earnings from 61·99 to 58·12.

Wharfage, the most important item of receipts, increased by Rs. 1,35,681, or by 27 per cent., due to the greater volume of traffic, chiefly in oil-seeds, railed down. During the year, 25 more ocean-going steamers and six less coasting-steamers called at the Harbour than in the year 1932, due to increase in import and export traffic and to a falling off in the export of cotton, respectively. The increases under all the other heads of revenue are a reflection of the larger volume of traffic handled.

The working expenses of the Harbour include a sum of Rs. 51,447 under "Superior Supervision" due to admissibility of supervision charges by the Madras & Southern Mahratta Railway during the year under review, in terms of clause 19 of the working agreement. No such supervision charges were admissible during the previous year.

The weight of imports dealt with at the Harbour amounted to 124,327 tons as compared with 110,232 tons in 1932, an increase of 14,095 tons, or 12 per cent., mainly under the headings of grain, general goods, machinery, and coal and coke. The traffic in kerosene-oil and tiles, however, decreased. There was an increase in railway coal of 12,631 tons, but public coal decreased by 7,104 tons, due to a falling-off in demand. During the year, 9,522 tons of coal (7,905 tons Bengal and 1,617 tons African) were landed at the port compared with 16,626 tons Bengal in 1932. It is interesting to note that shipments of African coal have been resumed. In the case of kerosene-oil in bulk the fall is due to less demand from up-country.

Exports totalled 340,472 tons, representing an advance of 75,529 tons or 28 per cent. on last year's figures. The outstanding feature of the export traffic in 1933 is the increase under groundnuts of 64,850 tons, due to a greater demand in Europe for this commodity. The provision of sleepered plots for convenience in manipulating seed-cargo and of extra shed-accommodation continues to prove attractive, and three additional firms have commenced business in this description of merchandise during the year. The following figures indicate the extent to which shipments of groundnuts have been made during the past four years:—

Year	Tons
1930	146,537
1931	270,184
1932	91,595
1933	156,444

So far as the prospects of groundnut shipments during 1934 are concerned, it is difficult to forecast the result owing to the still unsettled conditions of the Continental and Home markets. It is interesting to note, however, that for the first three months of the current year the export of grain and seeds, which consist chiefly of groundnuts, amounted to 54,847 tons as compared with 41,051 in the same period of the year 1933, quite an appreciable increase.

Further considerable progress was made during the year under review in the provision of additional facilities on the Railway and at the Harbour, which work is being carried out under the subsidiary contract of 9th February, 1929, between the Portuguese Government and the Company. All the works, so far as sanctioned under the scheme, have been completed, with the exception of the Quay Wall Extension, watering arrangements and electrification. These are well advanced and should be finished in a few months' time.

The total outlay on the new works up to the end of December, 1933, amounted to £154,358. Of this expenditure, the Company had recovered from the Portuguese Government to that date, the sum of £141,660, leaving a sum of £12,698 outstanding at the end of the year.

As regards this year's bonus out of reserve, you will note from the report before you that the Board have decided to make a distribution in respect of the half-year ended June 30th, 1934, of 1 per cent. actual making a total payment, with the usual dividend of 2½ per cent., of 3½ per cent. for the half year. This is payable to stockholders on the 14th July next.

Our thanks are due to Commander J. Valente da Cruz, the Portuguese Government ex-officio Director, and to Commander A. de M. Machado, the Company's representative in Lisbon, for the manner in which they have conducted negotiations on all matters which we have had occasion to refer to the Portuguese Government through them.

In conclusion, I wish to take advantage of this opportunity of expressing our cordial appreciation of the able management of the Company's affairs in India by the Madras & Southern Mahratta Railway and also of the services of the Joint Representative at Mormugao, Mr. J. M. Tew. You will also, I am sure, join me in acknowledging the services of our London office staff and also those of the Madras & Southern Mahratta Railway Company, for their help in connection with our affairs on this side.

I now beg to propose "That the Directors' Report and Statements of Accounts for the year ending 31st December, 1933, be approved and adopted," and I will ask my colleague, Mr. G. K. Wasey, to second that proposal.

Mr. G. K. Wasey (a Director): Gentlemen, I beg to second the proposal.

The Chairman: Before putting the Resolution to the Meeting, I should like to invite the remarks of Members present in respect of the contents of the Report and also in regard to any other matters connected with the business of the Company, which may appear to call for comment.

Mr. W. Ralph Hall Caine: Mr. Chairman and Gentlemen, I think before we formally pass to the usual proceeding of adopting the report, it would be a gracious act on our part to convey through you, Mr. Chairman, to Mr. Sawyer our deep sympathy with him in his recent illness and our delight to hear that he is so well on the way to recovery. It is a further pleasure to us to find that his place at the Board is not going to be filled but will be available to him at the moment at which he is sufficiently recovered to return. He has been so long associated with the Railway and so intimately associated with it that it has been truly said that there is hardly a bolt on the entire line with which he is not personally acquainted. I think that possibly expresses in figurative language precisely our notion of his intimate concern with our affairs, and I think that it would be a very gracious act on our part through you to express to him our warmest thanks for his services in the past and our hope for further services in the future.

While I am on my feet, I may perhaps be permitted also to congratulate the Directors on the very efficient and very satisfactory manner in which they have conducted our affairs during the past year. The future of India and all that relates to the immediate territory is the subject of a good deal of controversy, but I am perfectly satisfied that India, of all foreign countries, is certainly the safest and best investment to which an English capitalist could turn

his eyes. I think that those general views will meet with the general approval of the other Shareholders present.

Mr. W. C. Weight: Mr. Chairman and Gentlemen, I should like to add a word to that. I have been associated with the Company now for a great number of years. I remember the Stafford House Committee, and I worked out figures for the late Mr. Harrison Hayter when he attended the meetings; and one thing which I have always had borne in upon me is the careful manner in which the Company's business has been managed. There has never been a mistake as far as I can see; the management has been cautious, and there is no work, included in the original scheme, which has become obsolete or useless. It has been well thought out, and the final decision, in my estimation, has always been on the right side. (Hear, hear.)

The Chairman: If there are no further remarks, I will put the motion to the meeting. It has been seconded by Mr. Wasey. Will those in favour of it please signify in the usual manner? . . . . That is carried.

I should like to reply to Mr. Hall Caine's very complimentary remarks about Mr. Sawyer—not that they have not been fully earned; but I need hardly say that the Board will take care that the views of the Shareholders—and I take it that you all agree with the views expressed by Mr. Hall Caine—will be communicated to Mr. Sawyer.

The next business is the re-election of Directors, or rather the proposal that Mr. G. K. Wasey, who retires in accordance with the Articles of Association, being eligible, be re-elected. Mr. Wasey was associated with Mr. Sawyer in the construction of the line a very great many years ago now, and also in the operating of the line afterwards as Agent and Engineer. He subsequently became Secretary, and then some years ago was made a Director. With his full knowledge of the history and construction of the line he is a most valuable member of the Board.

Brigadier-General Sir Charles L. Magniac (a Director): Gentlemen, may I second that resolution?

(*The motion was put and carried unanimously.*)

Mr. G. K. Wasey: Gentlemen, I thank you very much for my re-election.

The Chairman: As regards Mr. E. E. Sawyer, the other retiring Director and our Chairman for the last 21½ years, you will have noted that, owing to ill-health, he does not seek re-election and, in order to comply with the desire of Mr. Sawyer and also with the requirements of the Articles of Association, I propose the following Resolution: "That in compliance with Mr. Sawyer's request his re-election on retirement by rotation shall not be proposed, and that the Board be requested to deal with the consequent position in accordance with the provisions of Article 74 of the Articles of Association." I may explain shortly that that Article gives the Board full power to fill up any vacancy on the Board——

Mr. Hall Caine: Should the occasion arise.

The Chairman: Yes, should the occasion arise; and the desire of the Board is to be left a free hand so that should Mr. Sawyer, as we very much hope he will do, recover entirely, he will resume his place; but he will have to be asked to resume his place, having decided, on reference being made to him, that he did not feel justified in allowing his name to come up for re-election until he was in a sufficiently good state of health to take up his duties. That was the position, and this resolution was drafted as soon as we heard that he had made a definite improvement in health, so as to afford the Board an opportunity of making use of his services again in that direction if he felt that he was able to undertake the work. Perhaps Colonel Low will second that resolution.

Colonel Stuart Low (a Director): I have much pleasure in seconding the resolution put to the meeting by the Chairman.

(*The motion was put and carried unanimously.*)

The Chairman: The only other business is the re-election of the Auditors. Will one of the members kindly propose that?

Mr. Hall Caine: Mr. Chairman and Gentlemen, I beg to move that Messrs. Norris Tucker & Co., Chartered Accountants, be and are hereby re-elected Auditors of the Company at the annual remuneration of £63.

In relation to the resolution which has just been passed, and as to which I should like to add a word, if I may say so it agrees entirely with the view which I expressed, and with the view which I have heard in conversation with other shareholders. My friend Colonel Westropp, I am sure, will avail himself of this opportunity of saying a word of parting—if it may be parting—with Mr. Sawyer; but we hope not.

Colonel G. R. C. Westropp: Mr. Chairman and Gentlemen, I beg to second the resolution, and I should like to second all that Mr. Hall Caine has said, and to associate myself wholeheartedly with everything he has said regarding Mr. Sawyer. I have known Mr. Sawyer now for a great number of years, first of all when he was on the construction of the line, and I know what a zealous and able servant of the Company he has always been.

(*The motion was put to the meeting and carried unanimously.*)

The Chairman: Gentlemen, that concludes the business of our Fifty-third Annual General Meeting.

Mr. Hall Caine: If I am not tiring the meeting, I should like to propose a vote of thanks to the Chairman for a very exhaustive Report. We will read it at our leisure, and we feel satisfied that it contains a vast amount of information of which otherwise we should have had no knowledge by the production of the Balance Sheet. I beg to propose a hearty vote of thanks to the Chairman for a most informative introductory speech.

Colonel G. R. C. Westropp: I have very much pleasure in seconding that, and I would ask the proposer if we might couple with it our hearty thanks to the rest of the Board here for the good work that they have done——

Mr. Hall Caine: Yes, I mean that.

Colonel G. R. C. Westropp: ——and to the staff both in London and in India for all the good work that they have done.

Mr. Hall Caine: Certainly; hear, hear.

(*The motion was put to the meeting and carried unanimously.*)

The Chairman: Gentlemen, I thank you on my own behalf and also on behalf of my fellow Directors for your very kind and complimentary remarks.

Mexican Railway Co. Ltd.

The 138th ordinary general meeting of the Mexican Railway Co. Ltd. was held on Wednesday, June 27, at Winchester House, Old Broad Street, E.C., Mr. Vincent W. Yorke (Chairman of the Company) presiding.

The Secretary (Mr. C. Tennant) read the notice convening the meeting, and the auditors' report.

The Chairman said that his optimistic forecast at the last general meeting, six months ago, had been more than justified. The present position and prospects were even better than had seemed possible at that time. Although the actual profit shown of 24,000 pesos was meagre enough, it was an advance on what might have been expected. Comparing the results for the half year ended December 31, 1933, with those for the corresponding period of 1932, the number of passengers carried had increased by 7·8 per cent., while the tonnage of national and foreign goods traffic rose by 14·5 per cent. There had been an unexpected and welcome increase of 13·5 per cent. in the amount of crude petroleum carried, in spite of the installation by the Mexican Eagle Company of a pipeline for pumping oil from the oilfields to Mexico City. As a result of these developments, train kilometrage had risen by 6 per cent., entailing an increase in working expenditure of 7 per cent. This small rise could not be considered as unsatisfactory in view of the fact that it was partly due to higher cost of fuel oil and electric energy consequent upon the fall in exchange. It was an indication of the care with which the Management scrutinised the question of expenses. As compared with the first half of 1933, gross revenue had risen by approximately 26 per cent.

These improvements would have been impossible but for the recovery in Mexican industry. Five years of political tranquillity had served to restore confidence and the rise in the price of silver had stimulated mining enterprise. A large number of American factories had also been established in the country and agriculture had benefited from good harvests.

The permanence of the present satisfactory industrial situation, however, was unfortunately open to question. The Chairman pointed out that next July would see the elections for the Presidency of the Republic. Although no disturbances were anticipated from the elections themselves, the accession of the new President would be followed by the introduction of a six years' plan of a strongly nationalistic character which had recently been drawn up. This would certainly result in the exercise of greater control by the Mexican Government over public service enterprises. A more drastic Labour Law was also contemplated. Already, the Chairman said, legislation had been passed which made it very difficult to employ foreign experts in the country. This entailed the added expense and inconvenience of training Mexican employees of the railway to take their places. A further burden was the imposition of a tax of from 4 to 6 per cent. on remittances from Mexico by foreign companies for administrative purposes or the service of dividends.

The financial situation of the Company was slowly improving. The only immediate heavy capital expenditure in view was for the provision of fifty new freight cars to handle the increasing traffic, which would involve a sum in the neighbourhood of £50,000. The Company was still a long way from covering current financial liabilities, but the financial position was much better than it had been at the last meeting. There was also a possibility that the Interior Debt bonds to the value of £14 million held by the Company in respect of revolutionary and other claims might become of material value.

In conclusion, the Chairman read a cablegram which had been received from the Assistant General Manager. This referred to the general improvement expected in all classes of traffic. Tourist propaganda conducted in the United States was already beginning to show results. The forthcoming elections were causing excitement, but the political situation was still calm. Labour conditions on the railway were quiet, although there was some restiveness in other industries. The Chairman described this as the most encouraging message to be received for several years.

The report and accounts were unanimously adopted.

The Summer Train Services

(*See editorial note on page* 1126)

Very few changes have been made by British railways in their time-tables which come into operation on July 9 next, on the services which operated last summer. The most notable alterations are the introduction by the Great Western Railway of diesel-operated railcar services twice daily in each direction between Birmingham, Gloucester, Newport, and Cardiff, to which reference has already been made in THE RAILWAY GAZETTE, and by the London Midland & Scottish Railway of long-distance services on Saturdays which differ radically from those operating during the remainder of the week, and which, on time-sheets and in the published time-books, are given with great clarity in separate tables.

G.W.R.

Details of the Great Western summer service have already appeared in THE RAILWAY GAZETTE, but one or two features of the times are worthy of note. Apart from the new 60-min. booking over the 63·4 miles from Oxford to Paddington (at 10.10 a.m. from Oxford), the acceleration of the 9.15 (now 9.0) a.m. from Bristol to Paddington produces a run over the 106·9 miles from Bath to Paddington in 108 min.—the fastest time from Bath to London yet tabled, though the London-Bath run is made twice daily in 102 min. Other accelerations are made in the South Wales services from Paddington; the 11.55 a.m. and 3.55 p.m. expresses reach Newport non-stop in 141 min. (133·4 miles), and Swansea at 3.52 p.m. and 7.52 p.m., both 11 min. earlier than before; the 8.55 a.m. down also gets to Swansea at 12.52 p.m., 6 min. earlier. In the up direction the 10.55 a.m. and 3.55 p.m. from Swansea leave 5 min. later, and the 1.55 p.m. 10 min. later, with unaltered arrivals at Paddington, though in these cases the time is gained between Swansea and Newport, the considerably easier up journey times from Newport to Paddington remaining unaltered. The new 9.40 a.m. service from Paddington to Cheltenham introduces a non-stop run from Reading to Stroud, but the corresponding up train, at 4.20 p.m. from Cheltenham, calls also at Kemble and Swindon. This summer the Cornish Riviera Express reverts to a 4-hr. timing non-stop from Paddington to Plymouth (3 hr. 57 min. last year). As on the L.M.S.R., a notable sequence of non-stop journeys is made on Saturdays out of Paddington; apart from working stops, such as those for banking assistance at Newton Abbot, there are non-stop bookings at 8.50 a.m. to Teignmouth, 9.30 and 10.30 a.m. to Plymouth (North Road), 10.40 a.m. to Newquay, 10.55 a.m. to Newton Abbot, 11 a.m. to Plymouth (North Road), and 12 noon to Torquay—in every instance a journey of over 185 miles non-stop.

L.M.S.R.

The principal novelty in the L.M.S.R. tables is that an independent morning service is to be run from Blackpool to Euston, leaving Blackpool Central at 8.25 a.m. (and Blackpool North, by connection, at 8.30 a.m.), and Preston at 9.13 a.m., whence the unprecedented time of 3 hr. 39 min. is given over the 209 miles to Euston, reached at 12.52 p.m. A stop is made at Crewe, and the 158 miles thence to Euston are allowed only 155 min. For the first time for many years past, the Welshman, leaving Euston at 11.15 a.m. for the North Wales coast, runs daily throughout the week, non-stop to Prestatyn: in the return direction a stop is made this year at Chester, as well as the customary halt at Bletchley. The usual remarkable series of non stop runs is to be made on Saturdays from Euston, at 8.30 a.m. to Holyhead, 9.10 a.m. to Prestatyn, 10 a.m. to Carlisle, 10.55 a.m. to Stockport, 11.15 a.m. to Prestatyn, 11.35 a.m. to Preston, 1.15 p.m. to Penrith, 2.30 p.m. to Liverpool, 6 p.m. to Wilmslow, and 6.5 p.m. to Mossley Hill—all runs of over 175 miles in length. Certain of the special heavy week-end expresses are to be called "rapids."

L.N.E.R.

The principal innovation in the L.N.E.R. summer time-tables is the introduction of diesel railcar services in the North Eastern Area, including, in particular non-stop runs in both directions over the 42 miles between York and Hull in both directions in 52 min., connecting at York with express services to and from Newcastle, and additional express journeys between Hull, Selby, and Pontefract (connecting with trains to and from Sheffield), Hull and York, and York and Scarborough. Special express trains are run on Saturdays from King's Cross to Leeds at 12.5, 2.40, and 3.50 p.m. (the last-named non-stop to Wakefield); also at 10.10 and 11.25 a.m. to Scarborough, the latter a relief to the Scarborough Flyer, with no publicly-booked stop to Scarborough. This summer the Scarborough Flyer carries a through portion to and from Whitby daily, the down journey being completed in 5 hr. 5 min. With the aid of the new crossing and signalling equipment on the coast line between Saltburn, Whitby (West Cliff) and Scarborough, a very considerable increase is made in the coastal service, and the fastest time between Middlesbrough and Scarborough is brought down from 2 hr. 49 min. last summer to 2 hr. 12 min.

Southern Railway

A substantial curtailment of running times takes place between Bournemouth and Weymouth this summer, and Weymouth is for the first time brought within 3 hr. of Waterloo by the Bournemouth Limited services in both directions. The 12.30 p.m. ex Waterloo is booked into Weymouth at 3.39 instead of 3.53 p.m., and the 6.30 p.m. at 9.43 instead of 9.54 p.m.; in the up direction the 1.20 starts at 1.35 p.m., and the 5.20 at 5.35 p.m., though both arrive at Waterloo at 4.50 and 8.50 p.m. respectively. There are no other important Southern Railway changes calling for remark.

BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table of freight and passenger traffic figures for March, 1934, as compared with the corresponding period in 1933, compiled from the Ministry of Transport Statement No. 172

Description.	Great Britain*	Great Western	London & North Eastern	London Midland & Scottish	Southern
PASSENGER TRAIN TRAFFIC—					
Number of passenger journeys (excluding season-ticket holders)	95,666,561	6,977,070	13,489,634	22,636,043	16,689,142
Increase (+) or decrease (−)	+ 4,741,042	+ 317,878	+ 761,283	+ 1,562,075	+ 929,546
Passenger receipts (excluding season-ticket holders)	£3,764,045	£508,825	£725,560	£1,183,346	£816,878
Increase (+) or decrease (−)	+ £613,270	+ £94,337	+ £120,811	+ £207,673	+ £157,079
Season-ticket receipts	£718,661	£45,638	£130,195	£189,942	£229,064
Increase (+) or decrease (−)	− £47,561	− £4,704	− £12,693	− £13,208	− £12,444
Parcels and miscellaneous traffic receipts (excluding parcels post)	£1,110,459	£204,477	£328,889	£413,614	£136,351
Increase (+) or decrease (−)	+ £38,878	+ £2,644	+ £5,380	+ £22,988	+ £7,675
FREIGHT TRAIN TRAFFIC—					
Freight traffic (tons) (excluding free-hauled)	22,638,832	5,309,500	10,099,110	10,574,961	1,506,891
Increase (+) or decrease (−)	+ 2,317,638	+ 334,028	+ 1,176,169	+ 1,005,040	+ 166,813
Net ton-miles (excluding free-hauled)	1,276,087,509	229,988,000	431,675,821	516,876,802	60,955,310
Increase (+) or decrease (−)	+ 138,382,014	+ 16,068,604	+ 57,879,245	+ 53,006,681	+ 6,766,267
Average length of haul (miles) (excluding free-hauled)	56·37	43·32	42·74	48·88	40·45
Increase (+) or decrease (−)	+ 0·38	+ 0·33	+ 0·85	+ 0·41	+ 0·01
Freight traffic receipts—	£7,131,629	£1,185,000	£2,347,000	£2,945,000	£427,635
Increase (+) or decrease (−)	+ £675,027	+ £85,000	+ £272,100	+ £249,000	+ £49,031
Receipts per ton-mile	1·341d.	1·24d.	1·31d.	1·37d.	1·68d.
Increase (+) or decrease (−)	− 0·021d.	—	− 0·03d.	− 0·03d.	+ 0·01d.
Freight train-loads—					
Average train-load (tons)	130·53	135·59	138·04	126·74	111·81
Increase (+) or decrease (−)	+ 6·49	+ 5·61	+ 7·12	+ 5·84	+ 7·95
Net ton-miles—					
Per train engine-hour	1,012·79	1,081·54	1,071·95	965·73	886·25
Increase (+) or decrease (−)	+ 19·67	+ 60·28	+ 46·20	− 24·34	+ 50·20
Per shunting-hour	880·57	810·17	974·39	898·94	595·27
Per total engine-hour	471·03	463·20	510·42	465·57	356·09
Net ton-miles per route-mile per working day	2,793	2,703	3,000	3,274	1,263
Increase (+) or decrease (−)	+ 298	+ 190	+ 385	+ 334	+ 146
Wagon-miles. Total	364,569,558	64,580,063	125,329,994	153,920,587	18,442,810
Increase (+) or decrease (−)	+ 27,423,081	+ 2,616,356	+ 11,534,660	+ 11,743,608	+ 1,241,484
Percentage of loaded to total	66·28	67·68	63·97	67·71	65·32
Wagons per train—					
Total	35·14	35·15	35·73	35·17	32·59
Increase (+) or decrease (−)	+ 0·60	+ 0·26	+ 0·51	+ 0·79	+ 0·71
Loaded	23·29	23·79	22·86	23·82	21·29
Empty	11·85	11·36	12·87	11·35	11·30
Train-miles. Coaching—					
Per train-hour	15·07	13·81	14·09	14·55	17·75
Per engine-hour	12·09	11·05	11·03	11·07	14·52
Train-miles. Freight—					
Per train-hour	9·11	9·65	9·08	8·88	9·67
Per engine-hour	3·61	3·44	3·74	3·67	3·12
Total engine miles	44,669,541	7,025,152	12,332,723	16,520,684	5,902,071
Increase (+) or decrease (−)	+ 1,687,854	+ 150,373	+ 608,407	+ 740,985	+ 153,560
Mileage run by engines. Total train-miles—					
Coaching	21,554,747	2,930,779	4,918,417	6,813,003	4,233,391
Freight	10,376,044	1,837,528	3,507,868	4,376,862	565,920
Total engine-hours in traffic	4,867,617	826,048	1,454,358	1,896,636	492,496
Increase (+) or decrease (−)	+ 233,704	+ 11,126	+ 77,289	+ 126,809	+ 17,513
Shunting miles per 100 train-miles—					
Coaching	7·57	6·87	6·50	8·52	8·17
Freight	74·14	83·28	69·72	70·09	99·05

* All standard-gauge railways

Passenger Traffic Statistics: Number of Journeys, Receipts, and Receipts per Journey (excluding Season-Ticket Holders)—March, 1934

Subject.	Great Britain	Great Western	London & North Eastern	London Midland & Scottish	Southern	Cheshire Lines Committee	Liverpool Overhead	London Passenger Transport Board†	Mersey
Full fares—									
Passenger journeys	30,463,327	575,121	1,126,298	1,655,288	2,716,037	22,678	141,555	23,336,049	91,297
Gross receipts	£844,730	£76,139	£111,892	£130,655	£183,638	£2,933	£1,556	£320,903	£1,643
Receipts per passenger journey	6·66d.	31·77d.	23·84d.	18·94d.	16·23d.	31·04d.	2·64d.	3·30d.	4·32d.
Reduced fares—									
Excursion and week-end—									
Passenger journeys	36,705,012	4,080,156	8,142,156	13,139,397	8,111,830	416,528	114,866	1,046,394	648,100
Gross receipts	£2,307,149	£367,012	£501,618	£865,631	£480,752	£26,609	£901	£23,158	£9,755
Receipts per passenger journey	15·09d.	21·59d.	14·79d.	15·81d.	14·22d.	15·33d.	1·88d.	5·31d.	3·61d.
Workmen—									
Passenger journeys	24,847,514	1,886,316	3,293,163	6,757,321	5,155,680	238,422	186,660	6,266,400	188,310
Gross receipts	£356,069	£27,480	£52,393	£106,538	£83,709	£4,081	£1,531	£68,230	£1,714
Receipts per passenger journey	3·44d.	3·50d.	3·82d.	3·78d.	3·90d.	4·11d.	1·97d.	2·61d.	2·18d.
Other descriptions—									
Passenger journeys	3,647,020	435,477	925,853	1,082,911	705,207	43,040	444	370,634	11,424
Gross receipts	£253,048	£38,194	£58,310	£79,213	£68,395	£2,719	£2	£3,256	£147
Receipts per passenger journey	16·65d.	21·05d.	15·12d.	17·56d.	23·28d.	15·16d.	1·08d.	2·11d.	3·09d.
Total—									
Passenger journeys	95,666,561	6,977,070	13,489,684	22,636,043	16,689,142	720,676	443,525	31,019,477	939,131
Gross receipts	£3,764,045	£508,825	£725,560	£1,183,346	£816,878	£36,349	£3,990	£415,547	£13,259
Receipts per passenger journey	9·44d.	17·50d.	12·91d.	12·55d.	11·75d.	12·10d.	2·16d.	3·22d.	3·39d.

† Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway

NOTES AND NEWS

Diesel Railcar Trial in Belgium.—King Leopold took part the other day in a high speed test run, from Brussels to Ghent and back, of the new articulated diesel-electric railcar built by La Brugeoise et Nicaise & Delcuve for the Belgian National Railways, and described in our *Diesel Railway Traction Supplement* of May 18. A speed of 88 m.p.h. is reported to have been reached.

G.W.R. Summer Uniforms.—White linen pea-jackets and waistcoats will be worn by all G.W.R. restaurant car conductors as from July 1 in place of the present regulation brown coat and vest. Each man will be supplied with a clean set daily, and, to ensure an adequate supply being available, six sets to the measurement of each man have been made, a total of over 3,000 sets of linen.

Argentine Railway Wages.—According to a Reuters message, a resolution to the effect that, in view of the improvement in the economic position of the railways, the continuation of reductions in wages on a pro rata basis is unjustifiable, has been passed by the Argentine Railway Unions Congress. The resolution instructs the Council to terminate the existing situation by force if necessary.

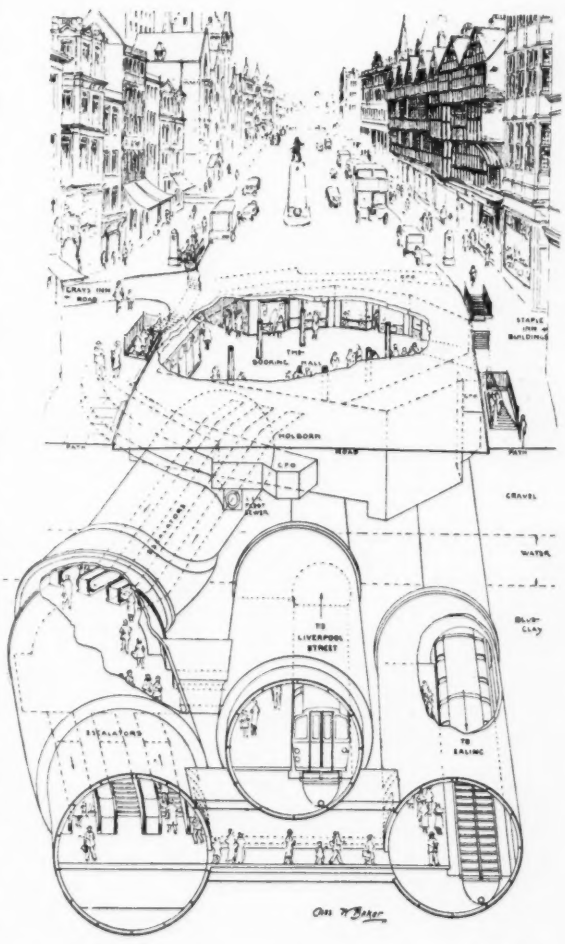
Swiss Railway Enterprise.—From June 2 to 12, Switzerland enjoyed a special Swiss Travel Week. Single tickets issued during this period allowed the holder to make his return journey free of charge, provided he did so within ten days of the date of issue and travelled outwards during the Travel Week. Express train and similar supplements were also charged in one direction only. Similar concessions were granted by the majority of Swiss transport undertakings, and special rates were in force on certain mountain railways. In addition to these facilities of limited duration, return and circular tour tickets for Switzerland issued in Great Britain are subject to a 30 per cent. cut during the summer, and hotel charges have been substantially reduced, conditional upon travellers remaining for seven days in the country. (See editorial note on page 1127.)

Signal Engineers' Summer Meeting.—We regret that in our report and editorial note thereon some errors occurred which escaped notice in proof reading. Mr. F. G. Wainwright is, of course, Divisional Superintendent, Cardiff, G.W.R., and not Assistant Divisional Superintendent. Owing to the insertion of a wrong line-of-type following a correction in proof reading, Mr. S. A. Blackall's initials were wrongly given and he was referred to as the son of the late Mr. Thomas Blackall, instead of Mr. A. T. Blackall. The sentence should have read: "The occasion afforded Mr. Griffiths an opportunity to refer to the fact that the first President of the Institution was Mr. A. T. Blackall, who, as son of the late Mr. Thomas Blackall, was the second of that name to be the Signal Engineer of the Great Western Railway. Mr. S. A. Blackall, Divisional Engineer, Newport (the son of Mr. A. T. Blackall), was responsible for the recent permanent way alterations at the General station at Cardiff."

Canadian Railway Musicians.—For the second year in succession, the Canadian National Railways Concert Orchestra has won the Beare Challenge Shield in the open orchestra class at the Stratford (Ontario) Musical Festival. The winning players are all railway employees.

The New Chancery Lane Station, London Transport.—On Monday last, June 25, the reconstructed Chancery Lane station on the Central London Line of the London Passenger Transport Board was brought into service. It is a sub-surface station, with entrances on both corners of Gray's Inn Road, and two on the south side of Holborn. The old entrance, which was about 100 yards east of the junction of Gray's Inn Road and Holborn, has disappeared. A drawing by Mr. Chas. W. Baker, of the new station, appears alongside. As will be seen from this, the new entrances lead to a large booking hall beneath the street surface, as at Piccadilly Circus. Five escalators are provided in two flights to take passengers to and from the platforms 65 ft. below the road level. The lower flight, connecting the east and westbound platforms, is the shortest on the Underground system, and has only 25 steps, the rise being but 15 ft. The old Chancery Lane station was the busiest of any non-interchange station on the Central London Railway. Just before the work on it was begun, some two years ago, over 150,000 passengers were using it every week, and in the preceding six years it had shown an increase of 30 per cent. in its traffic. The new booking hall is about ten times the size of the displaced one. On page 1127 of this issue we comment on some of the engineering problems encountered in the course of the reconstruction work.

Railways Act (Northern Ireland) 1934.—This Act, which received the Royal Assent on June 5, consists of six sections. The first section gives railways in Northern Ireland substantially the same powers as to holding, selling or otherwise disposing of lands which have within the past few years been granted to the four group railways in Great Britain by their individual Acts. Section 2, which contains amendments as to level crossings, follows in almost identical works, Section 42 of the Road and Rail Traffic Act, 1933, of Great Britain; and Section 3, which amends the duty of a railway company to report certain accidents under the Regulation of Railways Act, 1871, and the Railway Employment (Prevention of Accidents) Act, 1900, is almost identical with Section 43 of the 1933 Act. Section 4 enables a railway company, with the approval of the



Reproduction of a drawing by Mr. Charles W. Baker of the arrangement of the new Chancery Lane station, London Passenger Transport Board, which was opened on Monday last

Ministry of Commerce, to operate signals and points by electricity. The word "undertaking" in connection with the sale or disposal of lands under Section 1, includes the provision and running of road vehicles under the Railways (Road Vehicles) Act (Northern Ireland), 1927.

Performance of Garratt Locomotives, Kenya & Uganda Railways.—In our editorial note on page 1095 of last week's issue, it was stated that a Garratt locomotive No. 73 ran a mileage of 9,061 in one month. This was a misprint; the figure should have been 7,061 miles.

Closing of a Paris Local Line.—In the Overseas columns of THE RAILWAY GAZETTE last week it was announced that some trains are to be discontinued on the line between Paris and Arpajon, a small town in the *northern* outer suburbs. It should have been the *southern* outer suburbs. It is expected that the track, which runs on the side of the main road, will be removed and the road widened.

New London Stations.—The L.N.E.R. and G.W.R. announce that Ruislip Gardens, the new station which is being built between Ruislip station and South Ruislip & Northolt Junction station will be opened for traffic on July 9. The London Passenger Transport Board has begun work on the construction of the new South Harrow station on the Northolt Road. This involves the reconstruction of the bridge carrying the line over Northolt Road. Work has also been begun on the new station at Queensbury, between Kingsbury and Canons Park stations, on the Stanmore line of the L.P.T.B. This station will serve the new housing estate which is being developed on the site of the old Stag Lane aerodrome.

The Week's Road Accidents.—The Secretary to the Ministry of Transport has issued the following return, for the week ended June 16, of persons killed or injured in road accidents :—

	Killed in accidents reported during the week	Reported during the week as having died as the result of accidents occurring in previous weeks	Injured in accidents reported during the week
	No.	No.	No.
England ...	97	23	4,648
Wales ...	5	3	192
Scotland ...	11	3	440
Great Britain	113	29	5,280

The total fatalities of the week as the result of road accidents were therefore 142, as compared with 154 in the preceding week.

Institution of Electrical Engineers Conversazione.—There was an attendance of nineteen hundred at the annual conversazione of the Institution of Electrical Engineers, held at the Natural History Museum, South Kensington, on June 21. The President, Mr. P. V. Hunter, and Miss Hunter, supported by members of the Council, received the guests. There was a concert of vocal and instrumental items, including pianoforte solos by Mark Hambourg and songs by Miss Flora Woodman, and the string band of the Royal Engineers played selections in the central hall. Among those present were :—

The High Commissioner for Australia and Mrs. S. M. Bruce, Sir Thomas and Lady Callender, Sir Herbert and Lady Creedy, Mr. and Mrs. V. Z. de Ferranti, Mr. H. W. Ely (Acting Agent-General for Tasmania), the Agent-General for Quebec and Mme. Lemilux, Sir Holberry Mensforth, Mr. Handley Page, and Sir Ernest Petter.

Canadian National Earnings.—Gross earnings for the month of May were $14,767,854, an increase of $2,507,438 on May, 1933. The operating expenses of $12,948,819 showed an increase of $881,608, leaving net earnings of $1,819,035, an increase of $1,625,830. Aggregate gross earnings from January 1 to May 31, 1934, amounted to $65,581,300, an increase of $11,632,451 on the corresponding period of 1933, and net earnings were $3,390,248 an increase of $7,355,125.

Southern Railway Act, 1934.—The Royal Assent was given on June 22 to the Southern Railway Act, 1934.

L.M.S.R. Bill.—The London Midland & Scottish Railway Bill was read a third time, with the amendments, in the House of Lords on June 21, and passed and returned to the Commons. The Lords' amendments were considered and agreed to in the House of Commons on June 25.

London Transport Bill.—The London Passenger Transport Board Bill, which was read a third time and passed in the House of Commons on June 21, was read a first time in the House of Lords on the same date. A petition against the Bill has been lodged by the London County Council.

London Transport (Finance) Bill.—The London Passenger Transport Board (Interim Financial Arrangements) Bill came, on June 21, before the Committee of the House of Commons on Unopposed Bills. Mr. Frank Pick, Vice-Chairman of the Board, having explained the reasons for the promotion of the Bill, Mr. Geoffrey Cox, Parliamentary Agent, said that until the pooling scheme with the main line railways was complete the Board would not know what was its revenue. Until arbitrations now pending as to the amounts to be paid for certain omnibus undertakings the Board would not know the amount of stock to which the revenue applied. Consequently the Board could not meet the requirements of the Act of 1933 and prepare final accounts within two months of the close of the financial year, which would end in nine days' time. Mr. Pick further explained that the Board asked to be allowed to make an estimate of revenue as soon as possible and to pay interest on the C stock in accordance with that estimate. Leave was also asked to postpone the production of accounts for the first year until the end of the second year. He hoped that the negotiations with the main line railways would be completed before the summer holidays. The Bill was ordered to be reported for third reading, and was considered and read a third time and passed in the House of Commons on June 26. It was read a first time in the House of Lords on June 26 and referred to the Examiners.

Railway Labour Disputes in U.S.A.—President Roosevelt signed on June 21 the Railway Labour Disputes Bill, which provides means for strengthening the position of railwaymen in negotiating agreements with their employers.

Railway Co-operation in Canada.—The Bill announced by the Minister of Railways to enable the Canadian Pacific and the Canadian National Railways to unite their express and telegraph services has been withdrawn on account of the lateness of the session.

German Sixty Per Cent. Fare Reduction.—For foreign visitors, the German State Railway has announced a special reduction of 60 per cent. on all fares, provided that at least seven days are spent in Germany. This reduction comes into force on July 10 and will remain in operation until October 31.

Guernsey Railway Closed.—The service of the Guernsey Railway Co. Ltd., to which we made reference in our issue of June 1, was abandoned on the evening of Saturday, June 9. The original concession was granted in May, 1877, and the line opened with steam traction on June 6, 1879. Electric traction was inaugurated on February 20, 1892.

Improved traffic on L.M.S. canals.—A net increase of over 20,000 tons as compared with last year is reported by the L.M.S.R. in respect of traffic carried on the company's canals in England and Wales during the first five months of the year. This increase, which reflects generally improved trade, refers to the Cromford; Manchester, Bolton and Bury; Shropshire Union; St. Helens; and Trent and Mersey Canals.

Junior Institution of Engineers' Jubilee.—A luncheon was held at the Hotel Victoria, W.C.2, on Wednesday last, June 27, to celebrate the jubilee of the Junior Institution of Engineers. Mr. William J. Tennant, President of the Institution, was in the chair. Among those who spoke were Sir James Swinburne, Dr. Armstrong, and Colonel Crompton. In a reminiscent speech, Colonel Crompton declared that he was one of the few people who considered the present generation to be more intelligent and to have more knowledge than the people of many years ago.

Two New Passenger and Cargo Sheds for Southampton.—The Southern Railway has authorised the construction of two new double sheds on the 7,000-ft. quay in the new docks at Southampton. The sheds will be used for both passengers and cargo, and will

OFFICIAL NOTICES

THE MADRAS & SOUTHERN MAHRATTA RAILWAY CO. LTD. invite Tenders for :—

STEEL TYRES FOR LOCOMOTIVES

(1ft 8 Broad Gauge and 130 Metre Gauge).

Tenders are due in on Tuesday, 17th July, 1934, by 2 o'clock p.m.

Tender Forms are obtainable at address below, fee ONE GUINEA, *which will not be returned.*

The Directors do not bind themselves to accept the lowest or any Tender

Company's Offices :—

25, Buckingham Palace Road,
Westminster, London, S.W.1.

Bengal-Nagpur Railway Company Limited.

THE Directors are prepared to receive Tenders for :—

369 STEEL ENGINE TYRES.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after Thursday, 28th June, 1934.

A fee of 10s. will be charged for each copy of the Specification, which is *NOT* returnable.

Tenders must be submitted not later than Noon on Monday, 9th July, 1934.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
R. GRANT,
Secretary.

GENERAL YARDMASTER required immediately to control all inward and outward traffic amounting to 2,000,000 tons per year on Iron and Steel Works. Practical experience in locomotive maintenance also most desirable. State experience, age and salary expected.—Replies to Box No. 27, c/o THE RAILWAY GAZETTE, 33, Tothill Street, London, S.W.1.

OFFICIAL ADVERTISEMENTS

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

cost approximately £145,000. They will each be 1,470 ft. long and 150 ft. wide, with a large waiting room in the centre. The connection with the main line will be at Millbrook, so that expresses can run direct from the quayside to London in less than one and a half hours.

Locomotive Engineers' Golfing Society.—It is proposed to form a Golfing Society amongst the members, associates, and graduates of the Institution of Locomotive Engineers, and to hold an annual meeting at some golf course conveniently situated in the Midlands. A silver cup and two silver tankards have already been offered to be played for annually.

L.M.S. Improvements at Morecambe.—The working of through trains from the north into Morecambe will be considerably improved by a new junction which the L.M.S. Railway are bringing into use immediately at Hest Bank (Lancs) between Lancaster and Carnforth. Owing to the arrangement of the existing junction at Hest Bank, trains from the north for Morecambe have hitherto had to be placed in the bay platform at Hest Bank before departing over the branch line to Morecambe. The new direct junction will enable these trains to have a straight run on to the branch, and will not only improve their working, but will also minimise interference with traffic in the down main line.

Cheaper Fares and New Facilities Provided by Railway Air Services on I.O.W. Route.—As from Tuesday last, the fares between London and the Isle of Wight by Railway Air Services (in conjunction with Spartan Air Lines) were reduced to 19s. 6d. single, 38s. 6d. return—a reduction of approximately 33⅓ per cent. on the single and 20 per cent. on the return fares. Another innovation is the "out rail—home air" arrangement, whereby passengers holding rail summer tickets between Southern Railway London stations and the Isle of Wight may return by Railway Air Services on payment of supplements of 7s. and 11s. 6d. for first and third class respectively. Hitherto it has been possible to use the return half of an air ticket only for return by rail.

British Railway "C.O.D." Service.—The main line railway companies are introducing on July 1, a cash-on-delivery system applicable to traffic by both goods and passenger train services. The arrangement will apply to traffic between all points in Great Britain (with one or two minor exceptions) and also with certain Continental ports. "C.O.D." consignments may be sent up to a value not exceeding £40, and a small commission fee will be levied according to the value of the consignment. In an editorial article on page 1096 of last week's issue, we commented on the inauguration on June 1 of the postage forward parcels service by the Post Office.

Train "Cruises" in the North of England.—Yesterday (June 28) the L.N.E.R. tried as an experiment a 200-mile cruise by restaurant car express, starting from Newcastle-on-Tyne, following the Northumberland coast to the valley of the Tweed, and returning by the North Tyne valley. Stops of 1¾ hours were made at Alnwick, 2 hours at Kelso, 2 hours at Hawick, and 1 hour at Hexham. Lunch and high tea were served on the train, the cost being included in the comprehensive fare of 13s. 6d., with half charges for children under 14. A scenic excursion of a similar type was run from Bradford to Whitby and Scarborough on Sunday, June 24, giving 3 hours in Scarborough. Buffet cars were attached to this train.

Northern Ireland Traffics.—Statistics of railway traffic and receipts in Northern Ireland for the first three months of 1934, which have been furnished by the Ministry of Commerce, make comparisons with 1932, in view of the abnormal position created by the strike early in 1933. On railways wholly in Northern Ireland, the number of passengers in the three 1934 months was 830,787, against 1,046,559 in 1932, and the tonnage of minerals and merchandise 153,498 against 199,208. Receipts from passengers (including season tickets) for the three 1934 months were £41,295 against £45,964 in 1932, and goods and live stock receipts were 50,631 against £69,326. On railways partly in Northern Ireland, the number of passengers in the three 1934 months was 786,774, against 1,159,727 for the first three months of 1932, receipts from passengers being £73,878 gainst £89,912. Goods and livestock receipts amounted to £144,715 against £209,242, and the tonnage of goods and minerals was 249,084, compared with 319,417.

Railway and Other Reports

London Midland & Scottish Railway.—The announcement as to an interim dividend on the 5 per cent. redeemable preference stock, 1955, is deferred until July 26, when the traffic results for the full half-year will be available.

Thomas Firth & John Brown Limited.—The directors have decided to pay on July 2, the arrears of dividend on the 6 per cent. cumulative preference shares for the three years to December last.

Assam Railways & Trading Co. Ltd.—Dividends for the half-year ending June 30 are announced on the pre-preference "A" shares and the new 6 per cent. preference shares, payable on July 4.

South Manchurian Railway.—At the thirty-third annual general meeting of shareholders of the South Manchurian Railway held on June 20, it was decided to pay a dividend for the past year of 8 per cent. Net profits for the past year totalled 50,000,000 yen.

Edgar Allen & Co. Ltd.—A profit of £1,001 was earned for the year ended March 31 last, following losses for each of the three preceding years. This reduces the debit balance to be carried forward to £76,825. The preference dividend is in arrear from March, 1931. The general reserve has been reduced to £50,594 by the transfer of £17,998, being a loss on realisation of trading investments held by a subsidiary.

CONTRACTS AND TENDERS

The Richard-Garrett Engineering Co. Ltd. has received an order for two steel vertical cross-tube boilers from the Leopoldina Railway.

The Tilley Lamp Company has received further orders amounting to approximately 200 A.L.9 type lamps for the L.M.S.R., these being additional to the 300 recently supplied.

The Buda Co. (England) Ltd. has received orders for ten No. 2 Push Pull Velocipedes for track maintenance for the Argentine North Eastern Railway and eight for the Entre Rios Railway.

Kitchen & Wade Limited has received orders from the Buenos Ayres Great Southern Railway for one 7-ft. radial drilling, boring, tapping, and studding machine, and one 4 ft. 6 in. radial drilling machine.

The South African Railways and Harbours Administration has recently placed orders as follow :—

Edgar Allen & Co. Ltd. : Diamond crossings (Tender No. B6012. Total cost £380).
S. A. des Usines et Acieres Allard : Cast steel buttresses. (Tender No. B6003/2. Total cost £168).

D. Wickham & Co. Ltd. has received orders for petrol-driven railcars as follow :—Seven single-seater inspection railcars for the Central Uruguay Railway ; ten No. 17 track maintenance trolleys for the Entre Rios Railway ; ten No. 17 track maintenance trolleys for the Argentine North Eastern Railway ; and a 12-seater passenger saloon railcar for the Gwalior Light Railway.

Central Railway of Brazil Electrification Contracts

The General Railway Signal Co. Ltd. is to supply the all-electric signalling apparatus for the Central Railway of Brazil, the electrification of which by the Metropolitan-Vickers Electrical Co. Ltd. was referred to in this column in our June 30, 1933, and May 18, 1934, issues, and is further described in our *Electric Railway Traction Supplement* this week. The signalling apparatus is to be manufactured by the Metropolitan-Vickers Electrical Co. Ltd. at Manchester and will comprise both fully automatic and power controlled sections. The complete scheme of electrification covers a route length of 150 km.

The German State Railway Company has advised the German Association of Wagon Builders of the award of a further contract, according to the *Deutsche Allgemeine Zeitung*. The 1934 supplementary order for wagons, valued at some 17,500,000 marks, assured the works of employment till next November, and the new contract, amounting to thirty-eight or thirty-nine million marks, will keep them busy till about June, 1935. The sum mentioned refers only to the wagons themselves and not to other rolling stock included in the order. The contract will, as usual, be divided among the firms belonging to the Association in accordance with their quotas.

Taylor Bros. & Co. Ltd. has received an order for 80 locomotive tyres, 5 ft. 11⅛ in. diam., for the Egyptian State Railways.

The L.N.E.R. has placed an order for heavy duty wheels and axles for 12-ton wagons as follow :—Taylor Bros. & Co. Ltd., 400 pairs ; Steel, Peech & Tozer Limited, 400 pairs ; and John Baker & Bessemer Limited, 200 pairs.

The Egyptian State Railways Administration has recently placed the following orders :—

Head Wrightson & Co. Ltd. : Screw couplings for locomotives (Ref. No. E.S.R.21,150. Total cost £237 10s. 0d. delivery f.o.b., Middlesbrough).
Silvertown Lubricants Limited : Five metric tons engine oil at L.E.16.820 mills per ton and 15 metric tons engine oil at L.E.18,820 mills per ton.
Alan Thelwall Limited : 5½ metric tons cylinder oil at L.E. 26.466 mills per ton.
Sté Ame Gilsoco : 105 metric tons bolts and nuts for fishplates at L.E.12.040 mills per ton.

Chinese Orders

The Chinese Government Purchasing Commission on behalf of the Ministry of Railways, China, has placed the following orders to the inspection of Messrs. Fox & Mayo, consulting engineers :—Francis Morton & Co. Ltd. : Fabricated steel for railway workshop buildings for the Canton-Hankow Railway ; and C. M. Hill & Co. Ltd. : One portable tube and flue welding machine for the Hangchow-Kiangshan Railway. Orders have also been placed to the inspection of Messrs. Sandberg, consulting engineers, with Thos. Summerson & Sons Ltd. for two sets of points and crossings and 64 switch stands, and 78 sets of points and crossings.

Leyland Motors Limited includes the following among recent orders received :—Great Southern Railways of Ireland—16 Cub six-wheeled goods vehicles ; Yorkshire (Woollen District) Electric Tramways Limited—three oil-engined double-decked gearless buses and nine oil-engined Titan double-decked buses ; and Ramleh Electric Railways, Egypt—two special Lioness single-decked vehicles.

Tenders are invited, receivable by the Chief Controller of Stores, Indian Stores Department (Engineering Section), Simla, by July 12, for two 40,000 g.p.h. by 120 ft. head centrifugal pumping sets with 440-v.d.c. motors for the East Indian Railway ; also receivable by July 17, for alkaline electric train lighting cells, and, receivable by August 1, for the following machine tools required for the carriage and wagon and locomotive shops, Moghalpura, North Western Railway of India :—One plain 24-in. single purpose automatic milling machine ; one cross cut saw with capacity for 20 in. wide by 4 ft. deep timber ; one tube scaling machine to take tubes and flues from 1½ in. diam. to 6 in. ; one normalising furnace, alternatively electrically or oil heated, to accommodate two pairs of connecting rods of 13 ft. maximum length ; two portable jolt squeeze moulding machines with table capacity of approx. 26 in. by 17 in. ; two nut and bolt forging machines for nuts and bolts from ½ in. to 1½ in. diam. ; one single purpose automatic machine to take bars up to 2¾ in. ; and one horizontal universal surfacing, milling, drilling and tapping machine.

Coaches for South Africa

The South African Railways and Harbours Administration is calling for tenders, due at Johannesburg on July 30, for the supply of 20 first class and 30 second class coaches. These coaches, which are for the 3 ft. 6 in. gauge line and are to have wooden bodies, are to be 63 ft. long over sills. They are required complete with bogies, wheels and axles, vacuum brake gear, steam heating and electric lighting. Alternative quotations are invited for roller bearing axleboxes, and for delivery of the coaches in sections and completely erected. The first class coaches are of type C25, seating 39 passengers and convertible for night use to sleep 26. The second class coaches are of type E13 to seat 39 passengers and, when converted for night use, to sleep 39 passengers.

The South African Railways and Harbours Administration is calling for tenders, to be presented in Johannesburg by August 13, for the supply of vacuum brake gear rubber parts, such as hose pipe couplings, rolling rings, joint rings, coupling washers, van valve and vertical ball valve diaphragms, piston rod gland packing rings, for 12 months ending December 31, 1935. Firms desirous of offering goods of United Kingdom manufacture can obtain further details from the Department of Overseas Trade.

The Port and Railways Administration of Lourenço Marques is calling for tenders, to be presented in Lourenço Marques by October 18, for twenty 20-metric ton all-metal covered wagons of 45 to 50 cu.m. capacity for the 106.7 cm. (3 ft. 6 in.) gauge. Further details can be obtained by firms desirous of offering wagons of United Kingdom manufacture from the Department of Overseas Trade.

It is reported that the Indian State Railways Administration proposes to establish a plant for building locomotives, boilers and rolling stock at Tatanagar at an estimated cost of £1,000,000. It is further reported that a programme involving a total expenditure of over £3,000,000 for the renewal of rolling stock on the Indian State Railways has been approved by the Finance Committee on Railways.

British and Irish Railway Traffic Returns

GREAT BRITAIN	Totals for 25th Week			Totals to Date		
	1934	1933	Inc. or Dec.	1934	1933	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,940¾ mls.)						
Passenger-train traffic...	501,000	496,000	+ 5,000	10,504,000	10,409,000	+ 95,000
Merchandise, &c. ...	456,000	425,000	+ 31,000	11,106,000	10,118,000	+ 988,000
Coal and coke ...	176,000	183,000	– 7,000	5,902,000	5,604,000	+ 298,000
Goods-train traffic ...	632,000	608,000	+ 24,000	17,008,000	15,722,000	+1,286,000
Total receipts	1,133,000	1,104,000	+ 29,000	27,512,000	26,131,000	+1,381,000
L.N.E.R. (6,339 mls.)						
Passenger-train traffic...	331,000	320,000	+ 11,000	6,754,000	6,720,000	+ 34,000
Merchandise, &c. ...	294,000	274,000	+ 20,000	7,747,000	6,945,000	+ 802,000
Coal and coke ...	192,000	192,000	—	5,807,000	5,208,000	+ 599,000
Goods-train traffic ...	486,000	466,000	+ 20,000	13,554,000	12,153,000	+1,401,000
Total receipts	817,000	786,000	+ 31,000	20,308,000	18,873,000	+1,435,000
G.W.R. (3,750¾ mls.)						
Passenger-train traffic...	205,000	202,000	+ 3,000	4,381,000	4,413,000	– 32,000
Merchandise, &c. ...	181,000	167,000	+ 14,000	4,436,000	4,056,000	+ 380,000
Coal and coke ...	84,000	92,000	– 8,000	2,536,000	2,483,000	+ 53,000
Goods-train traffic ...	265,000	259,000	+ 6,000	6,972,000	6,539,000	+ 433,000
Total receipts	470,000	461,000	+ 9,000	11,353,000	10,952,000	+ 401,000
S.R. (2,176 mls.)						
Passenger-train traffic...	329,000	311,000	+ 18,000	6,587,000	6,516,000	+ 71,000
Merchandise, &c. ...	68,000	65,000	+ 3,000	1,554,500	1,478,500	+ 76,000
Coal and coke ...	26,000	25,000	+ 1,000	802,500	736,500	+ 66,000
Goods-train traffic ...	94,000	90,000	+ 4,000	2,357,000	2,215,000	+ 142,000
Total receipts	423,000	401,000	+ 22,000	8,944,000	8,731,000	+ 213,000
Liverpool Overhead ... (6½ mls.)	1,220	1,216	+ 4	27,588	27,115	+ 473
Mersey (4½ mls.) ...	3,706	3,417	+ 289	103,230	98,824	+ 4,406
*London Passenger Transport Board ...	542,200	—	—	25,958,600	—	—
IRELAND						
Belfast & C.D. pass. (80 mls.)	3,086	2,832	+ 254	50,251	51,521	– 1,270
,, ,, goods	525	500	+ 25	13,238	13,204	+ 34
,, ,, total	3,611	3,332	+ 279	63,489	64,725	– 1,236
Great Northern pass. (562 mls.)	11,350	8,700	+ 2,650	199,500	125,500	+ 74,000
,, ,, goods	7,650	8,500	– 850	204,800	132,000	+ 72,800
,, ,, total	19,000	17,200	+ 1,800	404,300	257,500	+ 146,800
Great Southern pass. (2,158 mls.)	29,174	25,603	+ 3,571	519,457	501,861	+ 17,596
,, ,, goods	31,357	21,971	+ 9,386	806,276	755,261	+ 51,015
,, ,, total	60,531	47,574	+ 12,957	1,325,733	1,257,122	+ 68,611

* 51st Week.

Exports of Railway Material from the United Kingdom in May

	May, 1934	May, 1933	Five Months Ended May, 1934	Five Months Ended May, 1933
	£	£	£	£
Locomotives, rail	11,076	211,802	119,268	479,579
Carriages and wagons	54,942	46,907	285,273	209,796
Rails, steel	109,951	110,301	243,961	205,033
Wheels, sleepers, fishplates and miscellaneous materials	92,474	94,532	328,745	297,215

Locomotive and rail exports included the following :—

	Locomotives		Rails	
	May, 1934	May, 1933	May, 1934	May, 1933
	£	£	£	£
Argentina	—	104,411	4,262	—
Union of South Africa	—	830	43,091	59,541
British India	—	47,207	28,541	742

Forthcoming Events

June 29 (*Fri.*)—Institution of Petroleum Technologists, at Park Lane Hotel, Piccadilly, London, W.1, 7 for 7.30 p.m. Annual Dinner.

July 1–8.—International Tramways and Transport Association, at Berlin. Biennial Congress.

July 3 (*Tues.*)—Retired Railway Officers Society, at the Abercorn Rooms, Great Eastern Hotel, E.C., ordinary meeting, 2.30 p.m.; at Bishopsgate Institute, organ recital, 3.30 p.m.

July 7 (*Sat.*).—Wimbledon and District Model Railway Club. Visit to Ashford Locomotive Depot, Southern Railway.

July 7–12.—Permanent Way Institution, at London. Jubilee Convention.

July 11 (*Wed.*)—Institution of Electrical Engineers, Savoy Place, London, W.C.2. Conversazione and Reunion.

British and Irish Railway Stocks and Shares

Stocks	Highest 1933	Lowest 1933	Prices June 27, 1934	Prices Rise / Fall
G.W.R.				
Cons. Ord. ...	55½	31	51	–½
5% Con. Prefce. ...	109¾	69½	112½	—
5% Red.Pref.(1950)	109¼	87½	108½	—
4% Deb.	108 15/16	99¼	105½*	–2½
4½% Deb.... ...	108	100¾	108½*	–2
4½% Deb.... ...	116	106	115½*	–2
5% Deb.	128	117¼	126½*	–2
2½% Deb.... ...	65	60	69¼*	–1
5% Rt. Charge ...	124	111½	125¼*	–2
5% Cons. Guar. ...	122	103	123½	–1
L.M.S.R.				
Ord.	29⅞	12⅛	22	–1
4% Prefce. (1923)	51	17	46½	–1
4% Prefce. ...	72	33¼	77	–½
5% Red. Prf. (1955)	93	47¼	99	—
4% Deb.	103¼	89½	101½	–1
5% Red.Deb.(1952)	114	105	111½	—
4% Guar.	97¼	68⅝	99½	—
L.N.E.R.				
5% Pref. Ord. ...	22½	7¾	16½	–½
Def. Ord.	10¾	4⅛	7¾	–¼
4% First Prefce. ...	65½	19⅝	65	—
4% Second Prefc .	40½	12¼	32	—
5% Red.Pref.(1955)	83¾	27	84	–1
4% First Guar. ...	94¾	58¼	94½	–1
4% Second Guar.	89¼	48	89	–½
3% Deb.	77	60¼	76½	–½
4% Deb.	102¾	80	100½	–½
5% Red.Deb.(1947)	112	102½	108½	—
4½% Sinking Fund Red. Deb.	107½	98¾	106½	—
SOUTHERN				
Pref. Ord.... ...	71	27¾	76	–1
Def. Ord.	24⅜	9⅜	24	–½
5% Prefce. ...	107 11/16	74	111	—
5% Red.Pref.(1964)	107¾	78⅞	111½	—
5% Guar. Prefce.	124¼	102¾	124½	—
5% Red.Guar.Pref. (1957)	115⅝	103½	115½	—
4% Deb.	107½	96¾	104	–½
5% Deb.	126½	114¼	126½	+1
4% Red. Deb. 1962–67	107¼	100	106½	—
BELFAST & C.D.				
Ord.	6	4	5	—
FORTH BRIDGE				
4% Deb.	99½	95½	101½	+1
4% Guar. ...	98½	94	100½	—
G. NORTHERN (IRELAND)				
Ord.	7½	3½	5	—
G. SOUTHERN (IRELAND)				
Ord.	28	16	20	—
Prefce.	24	12⅛	16½	+½
Guar.	42	16¾	43	+3
Deb.	60	30⅞	63½	+½
L.P.T.B.				
4½% "A" ...	117⅞	112	118	—
5% "A"	127¼	119¼	127	—
4½% "T.F.A." ...	111¼	106	108	—
5% "B"	122½	114	121½	–½
"C"	86¾	74½	75½	+1
MERSEY				
Ord.	16¼	5	14	—
4% Perp. Deb. ...	83	63⅞	87½	—
3% Perp. Deb. ...	62	51	65½	—
3% Perp. Prefce....	50⅝	27	53½	—

* ex-dividend

Railway Share Market

The stock and share markets have been more subdued, partly owing to the approach of the holiday season and the uncertainties of the international situation. As far as concerns the Home Railway market there is no indication of any heavy liquidation, although on some days prices have been marked down owing to absence of support. Brokers report a steady volume of inquiry for railway stocks which furnish scope on the long view for appreciation in capital value. The strength of British Government securities has caused a further demand for the prior charge stocks of home railways, but the amount of stock available is limited.

Great Western 4 per cent. debentures can be purchased, "ex" dividend, in a reasonable amount to give a yield of 3¾ per cent., and there is a line of London Midland & Scottish 4 per cent. debenture stock on offer at 102 to give a yield of £3 18s. per cent. Southern 4 per cent. debenture stock is on offer but at the higher level of 104½, at which the yield is £3 16s. per cent., whilst 4½ per cent. is obtainable from the same company's 5 per cent. preference stock. Of the London & North Eastern prior charges there is a line of the 4 per cent. first guaranteed stock on offer at 95½ to yield £4 5s. per cent., and another of the 4 per cent. debenture stock at 100¾ to yield nearly 4 per cent. Of the junior stocks Southern issues continue to receive most attention. The preferred ordinary stock has maintained its recent appreciation, whilst the deferred ordinary stock is favoured on its long-term prospects. London Passenger Transport "C" stock came back into favour and reached a higher level. Impending dividend statements are being awaited with interest in the market, and interesting movements in some of the stocks are expected to occur during the ensuing month. The L.M.S. directors were not expected to make any decision as to the dividend, normally payable on July 1, on the 5 per cent. redeemable preference stock until the half-yearly decision had been made in regard to the 4 per cent. preference stock which ranks *pari passu*. This will be announced on July 26.

In foreign railway stocks Argentine issues strengthened temporarily on the excellent traffic returns of the Cordoba Central and other railways, but the amount of buying support did not exceed the stock on offer and prices on balance were unresponsive to the movement. Uruguay issues came on offer and Brazilian stocks generally marked lower prices. Nitrate issues are weaker. Business was done in Barranquilla shares at around 4s. 9d., based on the offer now being made to exchange 28 fully-paid shares of 5s. each in the Barranquilla Investment Trust for every 20 shares in the railway.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1933–34	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1933	No. of Week	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1933	Prices: Lowest 1933	Prices: June 27, 1934	Yield % (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	830	24.6.34	20,320	+ 5,540	25	323,950	249,870	+ 74,080	Ord. Stk.	26	11¾	21½	Nil
	Argentine North Eastern..	753	23.6.34	13,000	+ 1,700	51	541,200	553,400	— 12,200	,,	14½	5	8	Nil
	Argentine Transandine ..	111	—	—	—	—	—	—	—	A. Deb.	55	40	50§	8
	Bolivar	170	May, 1934	6,600	+ 250	21	33 650	37,150	— 3,500	6 p.c. Db.	10	5	10	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	15	11	13	37/8
	Buenos Ayres & Pacific ..	2,806	23.6.34	122,000	+ 22,000	51	5,711,000	5,640,000	+ 71,000	Ord. Stk.	26	9716	12	Nil
	Buenos Ayres Central ..	190	20.5.34	$115,700	— $8,600	47	$5,015,653	$4,906,639	+ $109,014	Mt. Db.	30	10	21	Nil
	Buenos Ayres Gt. Southern	5,085	23.6.34	220,000	+ 40,000	51	10,278,000	10,389,000	— 111,000	Ord. Stk.	44½	21½	27	Nil
	Buenos Ayres Western ..	1,926	23.6.34	70,000	+ 5,000	51	3,477,000	3 478,000	— 1,000	,,	34½	15¾	21	Nil
	Central Argentine ..	3,700	23.6.34	‡210,000	+ 32,000	51	8,751,000	9 175,000	— 424,000	,,	28½	15	17	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	18	10	9	Nil
	Cent. Uruguay of M. Video	273	23.6.34	15,092	+ 631	51	833,584	772 656	+ 60,928	Ord. Stk.	20	8	12	Nil
	Do. Eastern Extn.	311	23.6.34	3,043	+ 286	51	173,081	166,556	+ 6,525	—	—	—	—	—
	Do. Northern Extn.	185	23.6.34	2,441	+ 242	51	98,932	100,981	— 2,049	—	—	—	—	—
	Do. Western Extn.	211	23.6.34	859	— 352	51	77,648	66,328	+ 11,320	—	—	—	—	—
	Cordoba Central	1,218	23.6.34	55,000	+ 13,000	51	2,107,000	2,035,000	+ 72,000	Ord. Inc.	9¼	2½	5	Nil
	Costa Rica	188	Apl., 1934	14,704	— 950	43	181,164	194,290	— 13,126	Stk.	29	20	26½	79/16
	Dorada	70	May, 1934	10.300	+ 1,500	21	51,400	35,200	+ 16,200	1 Mt. Db.	76½	68¾	95	65/16
	Entre Rios	810	23.6.34	15,700	+ 700	51	785,300	761,200	+ 24,100	Ord. Stk.	26½	9	15½	Nil
	Great Western of Brazil ..	1,082	23.6.34	6,400	+ 100	25	203,400	270,400	— 67,000	Ord. Sh.	23/6	1/2	5/8	Nil
	International of Cl. Amer.	794	Apr., 1934	$468,465	+ $46 901	17	$1,991,550	$1.778,384	+ $213.166	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	1/2	1/16	1/2	Nil
	La Guaira & Caracas ..	225/8	May, 1934	3,795	— 1 485	21	19.040	32,520	— 13.480	Stk.	16	10	8½	Nil
	Leopoldina	1,918	23.6.34	23,852	+ 2,410	25	531,511	569,799	— 38.288	Ord. Stk.	20¼	10	9½	Nil
	Mexican	483	21,6,34	$216,500	+ $39.400	24	$5,647,000	$4,528.400	+ $1,118.600	,,	3	1/2	2½	Nil
	Midland of Uruguay ..	319	May, 1934	8 601	— 158	47	103,709	94,125	+ 9,584	Ord. Stk.	2	1	1½	Nil
	Nitrate	401	15.6.34	4,937	+ 2 264	23	129.076	48,067	+ 81.009	Ord. Sh.	78/6	11/16	27/8	Nil
	Paraguay Central	274	23.6.34	6,770	+ 2,330	51	183,840	155,260	+ 28.580	Pr. Li. Stk.	72	49½	72	85/16
	Peruvian Corporation ..	1,059	May, 1934	62,512	+ 14.349	47	619.408	577.473	+ 41,935	Pref.	15¼	5	12	Nil
	Salvador	100	2.6.34	1.288	— 192	49	73.405	133,820	— 60.415	Pr. Li. Db.	70	66½	70	7/8
	San Paulo	153½	17.6.34	34,255	— 1,983	24	736,060	733,177	+ 2,883	Ord. Stk.	102	68	77	5/16
	Taltal	164	May, 1934	2,710	+ 435	48	63,645	38,450	+ 25,195	Ord. Sh.	1¾	3/4	1/16	1/2
	United of Havana.. ..	1,365	23.6.34	17,092	+ 4,814	51	969,253	964,190	+ 5.063	Ord. Stk.	8	2	4½	Nil
	Uruguay Northern ..	73	May, 1934	1,048	+ 144	47	12,555	15,497	— 2,942	Deb. Stk.	6	3½	4½	Nil
Canada.	Canadian National ..	23,748	21.6.34	649,326	+ 5,916	24	15,002,852	12,571,899	+2,430,953	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	—4 p.c.	Perp. Dbs.	60½	38	67	5/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	99¾	85	102½	3/8
	Canadian Pacific	17,018	21.6.34	428,600	— 77,600	24	10,741,200	9,460 600	+1,280.600	Ord. Stk.	22/8	11	15	Nil
India.†	Assam Bengal	1,329	26.5.34	26,407	+ 4,952	8	223,560	172,439	+ 51,121	Ord. Stk.	79	70	77½	3/8
	Barsi Light..	202	2.6.34	3,315	+ 443	9	29.700	28,222	+ 1,478	Ord. Sh.	10¼	70	100½	6
	Bengal & North Western..	2,112	2.6.34	59,620	+ 2.800	9	491 268	489,991	+ 1.277	Ord. Stk.	292	240	273½	5/8
	Bengal Dooars & Extension	161	2.6.34	2,211	— 396	9	20 097	20,908	— 811	,,	127	119	125	5/8
	Bengal-Nagpur	3,269	26.5.34	143,475	+ 32.868	8	988 275	846,314	+ 141,961	,,	97¼	83½	100½	31/16
	Bombay, Baroda & Cl. India	3,089	16.6.34	169,875	+ 15,300	11	1 892 250	1.817,175	+ 75,075	,,	112	107	108½§	5½
	Madras & South'n Mahratta	3,230	26.5.34	133,800	+ 5.282	8	985.575	924 219	+ 61,356	,,	127	114¼	124½	7¼
	Rohilkund & Kumaon ..	572	2.6.34	9,426	— 871	9	101 082	96 897	+ 4,185	,,	260	225	253	5/16
	South India	2,526	26.5.34	87,547	+ 9,576	8	657 069	629,442	+ 27,627	,,	119½	112	115½	61/16
Various.	Beira-Umtali	204	Apr., 1934	50,002	+ 10.132	30	340.976	274,597	+ 66,379	—	—	—	—	—
	Bilbao River & Cantabrian	15	May, 1934	1,350	+ 94	21	9,100	6,344	+ 2,756	—	—	—	—	—
	Egyptian Delta	621	10.6.34	5,232	+ 102	10	36.439	36,180	+ 259	Prf. Sh.	13132	1¾	17§	5/16
	Great Southern of Spain ..	104	16.6.34	1,570	— 160	24	52,334	50,336	+ 1,998	Inc. Deb.	4	3	3½	Nil
	Kenya & Uganda	1,625	Mar., 1934	240,520	+ 21,064	12	638.137	606,192	+ 31,945	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	53	33½	42½	8¼
	Mashonaland	913	Apr., 1934	93.558	+ 27,374	30	624,162	428,719	+ 195,443	1 Mg. Db.	91¾	42	92½	5/8
	Midland of W. Australia ..	277	Apl., 1934	11.826	— 607	38	134,041	130,844	+ 3,197	Inc. Deb.	89	70	97½	4/8
	Nigerian	1,903	12.5.34	32,076	+ 9,969	6	163,178	145,451	+ 17,727	—	—	—	—	—
	Rhodesia	1,538	Apr., 1934	154,881	+ 30,683	30	1,064,725	782,586	+ 282,139	4 p.c. Db.	98½	80¾	101	31/16
	South African	13,180	2.6.34	463,599	+ 52,490	9	4,232,764	3,611,222	+ 621,542	—	—	—	—	—
	Victorian	6,172	Mar., 1934	792,186	— 58,731	38	6,641,758	7,026,294	— 384,536	—	—	—	—	—
	Zafra & Huelva	112	May, 1934	11,081	+ 415	21	55,722	52,126	+ 3,596	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16.
† Receipts are calculated @ 1s. 6d. to the rupee. ‡ Average rate of exchange for the week:—This year 31 25/64. Last year 41 21/64. § ex dividend.